FINAL
RECORD OF DECISION
FOR
OPERATING INDUSTRIES, INC.
SUPERFUND SITE
MONTEREY PARK, CALIFORNIA

Volume 1

September 1996

Declaration

Site Name and Location

Operating Industries, Inc. (OII)
Monterey Park, California

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Operating Industries, Inc. (OII) Site, in Monterey Park, California, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

The State of California concurs with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Remedy

This ROD addresses liquids control and contaminated groundwater as well as long-term operation and maintenance of all environmental control facilities at the landfill, excluding those facilities covered under the Gas Migration Control and Landfill Cover ROD, as amended (EPA, 1990a; originally the Gas Migration Control ROD [EPA, 1988b]). Liquids will be controlled at the landfill perimeter to prevent migration of contaminants to groundwater. Contaminated groundwater currently beyond the landfill perimeter will be allowed to naturally attenuate over time. The U.S. Environmental Protection Agency (EPA) has signed three previous RODs for the OII Site. These cover Site Control and Monitoring, Leachate Management, and Gas Migration Control and Landfill Cover. The RODs for Site Control and Monitoring and Leachate Management were interim in nature and not considered permanent. These RODs are no longer applicable beginning with the signing of this ROD, although activities required under those RODs will continue as part of this ROD. The ROD for Gas Migration Control and Landfill Cover selected a final remedial action that represents a significant component of the permanent site cleanup, but is not included in, or modified by, this ROD.

The major components of the selected remedy for this action include:

- Installation of a perimeter liquids control system in areas where contaminants are migrating from the landfill at levels that cause groundwater to exceed performance standards. Contaminated groundwater beyond the landfill perimeter would be reduced to below cleanup standards through natural attenuation.

- Conveyance of the collected liquids to the onsite treatment plant.

- Onsite treatment of collected liquids using the existing leachate treatment plant, modified as necessary to handle the new liquids. Discharge of treated liquids to the County Sanitation Districts of Los Angeles County sanitary sewer system.

- Implementation of a monitoring and evaluation program to ensure that natural attenuation of the contaminated groundwater is progressing as anticipated, to detect future releases of contaminants from the landfill, and to ensure that perimeter liquids control system performance standards are being met.

- Establishment of institutional controls to ensure appropriate future use of the OII Site and to restrict groundwater use in the immediate vicinity of the OII Site. The institutional controls will supplement the engineering controls to prevent or limit exposure to hazardous substances.

- Interim operation and maintenance of existing site activities (gas extraction and air dike, leachate collection, leachate treatment, irrigation, access roads, stormwater drainage, site security, slope repair, and erosion control), except to the extent that they are addressed under the Gas Migration Control and Landfill Cover ROD.

- Long-term operation and maintenance of all facilities and environmental control components at the OII Site, excluding those covered under the Gas Migration Control and Landfill Cover ROD.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. Components of the selected final remedy satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. The size of the landfill mass precludes a remedy in which all contaminants could be excavated and effectively treated.

Therefore, consistent with the NCP and EPA guidance, including *Guidance for Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites* (EPA OSWER Directive 9355.3-11, February 1991a), the remedy uses containment to address the low-level threat from the landfill.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted at least once every 5 years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Keith A. Taka — 9-30-94

Keith A. Takata
Director of Superfund Division
U.S. Environmental Protection Agency, Region IX

Date

Contents

Tables

Figures

Acronym List

ARARs	applicable or relevant and appropriate requirements
BTEX	benzene, toluene, ethylbenzene, and xylene
Caltrans	California Department of Transportation
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
DTSC	California Department of Toxic Substances Control
EPA	Environmental Protection Agency
ft/day	feet per day
ft/yr	feet per year
gpm	gallons per minute
HELP	Hydrologic Evaluation of Landfill Performance model
hp	horsepower
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
mg/L	milligrams per liter
MOC	USGS Method-of-Characteristics code
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OII	Operating Industries, Inc.
OSWER	Office of Solid Waste and Emergency Response
PCB	polychlorinated biphenyl
PCE	perchloroethylene
ppm	parts per million
RCRA	Resource Conservation and Recovery Act of 1976
ROD	Record of Decision
SCAQMD	South Coast Air Quality Management District
TBC	to be considered
TCE	trichloroethylene
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
USGS	U.S. Geological Survey

Part I
Decision Summary

1.0 Site Summary

1.1 Site Location and Description

The Operating Industries, Inc. (OII) Site is located at 900 Potrero Grande Drive in the City of Monterey Park, approximately 10 miles east of downtown Los Angeles (Figure 1). The landfill property covers 190 acres and is divided by California Highway 60 (Pomona Freeway). The 45 acres to the north of the freeway are referred to as the North Parcel, and the 145 acres to the south of the freeway are called the South Parcel. The neighboring City of Montebello borders the South Parcel and portions of the North Parcel.

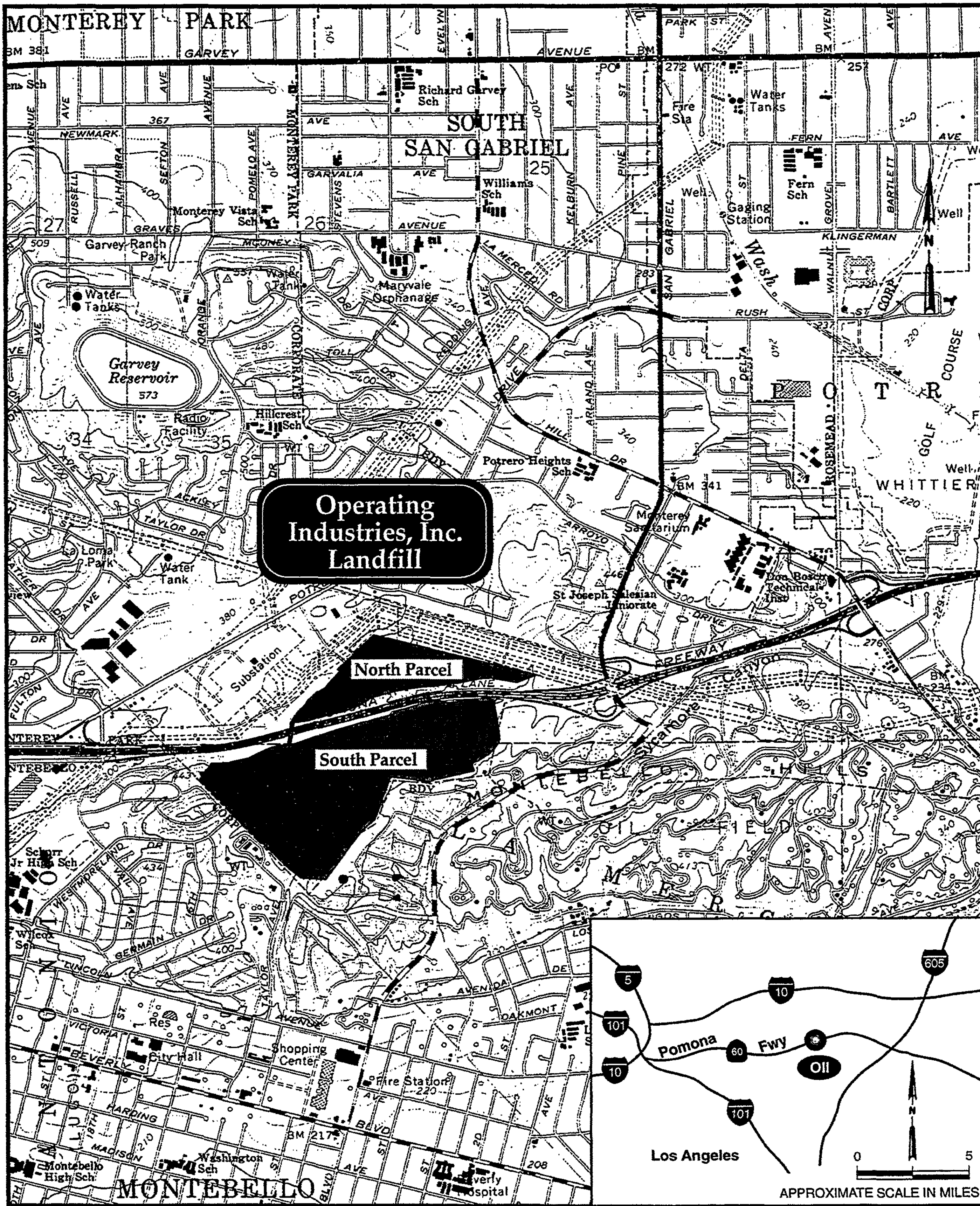
1.2 Physiography and Topography

This section discusses major physiographic and topographic features in the area surrounding the OII Site and within the landfill boundary itself.

The OII Site is located in central Los Angeles County, California, on the northwestern flank of the Montebello Hills (also known as the La Merced Hills). The Montebello Hills are one of a series of low-lying hills that separate the Los Angeles Coastal Plain from the San Gabriel Valley. The elevation of the crest of the Montebello Hills is approximately 570 feet above mean sea level. The San Gabriel Mountains, located approximately 12 miles to the north of the landfill, form the northern boundary of the San Gabriel Valley. Elevations in the San Gabriel Mountains exceed 10,000 feet mean sea level.

The Los Angeles Coastal Plain, to the south of the landfill, is a coastal plain sloping toward the Pacific Ocean, approximately 20 miles away. The Montebello Plain lies within the Los Angeles Coastal Plain just south of the Montebello Hills (and therefore just south of the OII Site) between the Los Angeles River and the Rio Hondo, and is considered by California Department of Water Resources to be a source of groundwater recharge to the Los Angeles Basin (CDWR, 1961).

The landfill was constructed by filling a former quarry pit that was cut into the side and top of a portion of the Montebello Hills. The landfill was ultimately constructed to a height higher than the adjacent Montebello Hills. Elevations at the landfill range from approximately



0 1000 2000

SCALE IN FEET

Source: USGS 7. 5-minute El Monte Quadrangle 1966 Photorevised 1981

Figure 1
Landfill Location Map
OII Site Final Record of Decision

m109994.16.01 locmap 8/96

380 feet above mean sea level at the North Parcel to 640 feet above mean sea level at the top deck of the South Parcel. The top of the South Parcel is about 150 to 250 feet above the surrounding natural grade, and the maximum depth of the landfill bottom is about 200 feet below the surrounding natural grade (EPA, 1987a).

The South Parcel landfill side slopes are quite steep: the north side of the South Parcel, directly adjacent to Pomona Freeway, is at a slope of about 2 (horizontal) to 1 (vertical) (an angle of approximately 27 degrees). The slopes on the east and south sides of the landfill are at approximately 3 to 1 (an 18-degree angle). The west slope is at approximately 4 to 1 (a 14-degree angle).

1.3. Land Use

This section presents a description of historic and current land use in the vicinity of the OII Site.

1.3.1 Historic Land Use

The Montebello Hills oil field, located to the southeast of the landfill, was developed in the early 1900s. The oil field has provided an abundant source of petroleum and natural gas reserves from petroleum exploration oil wells drilled in the vicinity of the landfill, including some within the current landfill boundary. Throughout its producing history, a significant percentage of the production from the Montebello Hills oil field has been a sodium-chloride brine. Historic maps of the oil field show the locations of apparent "brine ponds" associated with oil field activities in the area south and southeast of the landfill, including along the current southern boundary of the landfill. Later, oil field wastes are reported to have been disposed into the landfill.

Older aerial photographs (pre-1960) show little residential or commercial development near the landfill. By 1968, residential development had moved closer to the landfill; and by the mid-1970s, considerable residential and commercial development had taken place adjacent to the landfill boundary.

1.3.2 Current Land Use

The area surrounding the OII Site is heavily developed with mixed general commercial/industrial and residential land use, with small pockets of open space (Figure 2). Specific land use at and around the landfill is presented below as follows, beginning north of the North Parcel, and progressing clockwise around the landfill. Figure 2 shows approximate property boundaries and ownership/usage of properties adjacent to the landfill.

- A Southern California Edison substation complex occupies a portion of the property to the northwest of the North Parcel. The remainder of the property north of the North Parcel is occupied by two plant nurseries that share a common border with the North Parcel.

- Resurrection Cemetery is located north/northeast of the North Parcel.

- The North Parcel is partially occupied by the following businesses: Recycled Wood Products; Ecology Auto Wrecking; Manhole Adjusting, Inc.; and Aman Brothers Pavement Crushing.

  In addition, the OII Site leachate treatment plant is located on the North Parcel, as are the Environmental Protection Agency (EPA) and OII Landfill Work Defendants' office trailers. Aside from remediation activities and landfill investigations, there is no active land use on the South Parcel.

- The Montebello Town Square, a large shopping complex, occupies the land east of the South Parcel. A small strip on the east end of the landfill contains a landfill gas collection system installed as part of the development to reduce migration of landfill gas toward the shopping complex.

- The Montebello Hills oil field, which contains many active oil production wells, is located to the southeast of the South Parcel.

- On the southeast and south side of the landfill, adjacent land use is mostly low-density residential with pockets of medium-density residential and open space. Many homes in this area are located immediately adjacent to the landfill boundary and share a common property line with the landfill.

- A small piece of property adjacent to the southwest corner of the South Parcel is currently vacant.

- The surface facilities for a Southern California Gas Company underground natural gas storage reservoir adjoin the southwest portion of the South Parcel.

- The remainder of the western boundary of the South Parcel is bordered by residential development, similar to the residential areas south of the South Parcel.

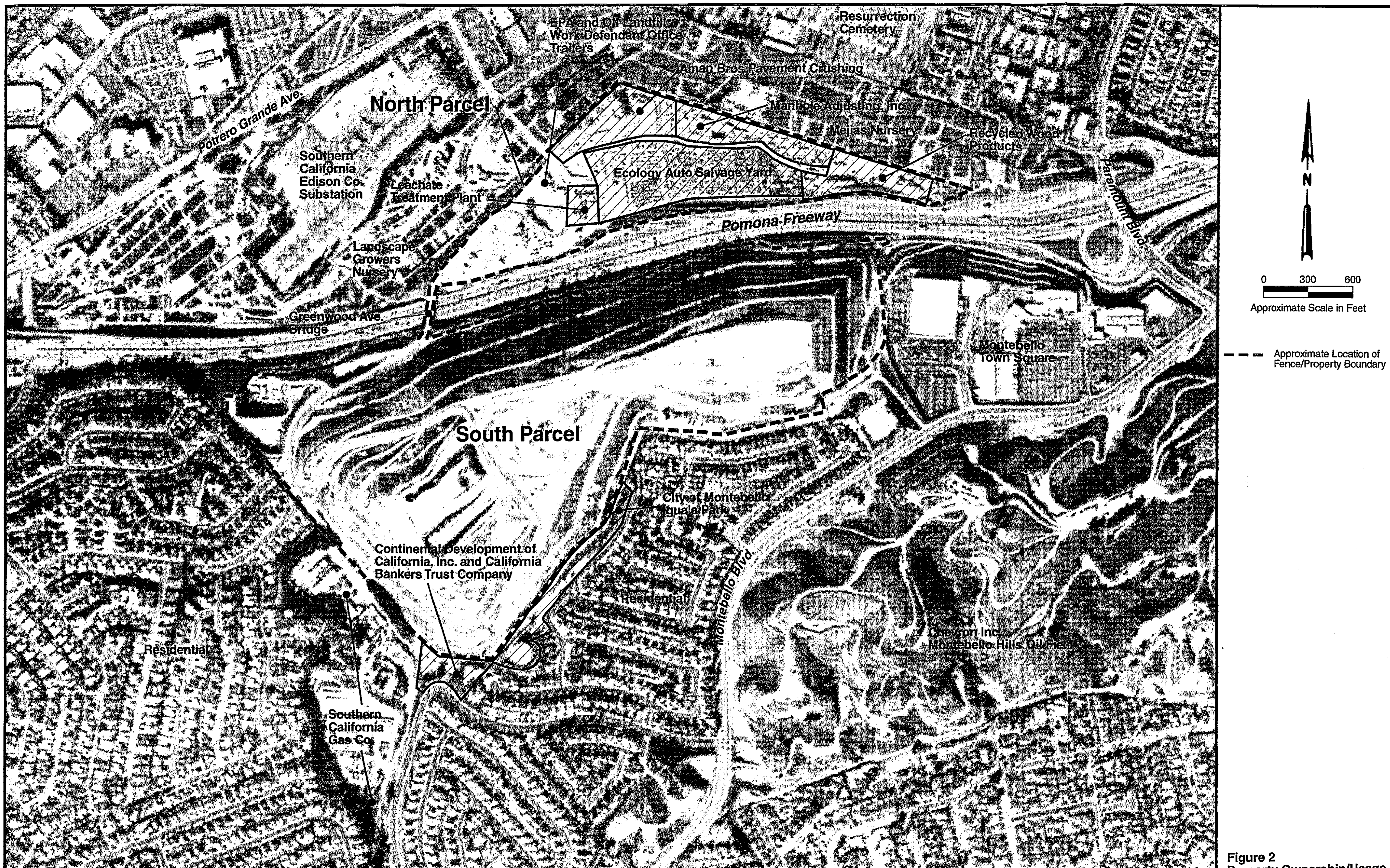


Figure 2
Property Ownership/Usage Adjacent to OII Landfill
OII Site Final Record of Decision

m\109994.16.01 fig2 8/96

1.4. Demographics

Demography, as presented in this section, is combined with discussions of land use to identify potential receptor populations for the assessment of health risks associated with the landfill. Population demographics in the census tracts that extend to an approximate 1-mile radius of the landfill boundary are presented. Additionally, there are several subpopulations within the overall population who may be more sensitive to, or receive more exposure to, environmental contamination. These subpopulations are termed "sensitive populations." Sensitive populations in the vicinity of the OII Site include young children, elderly persons, people who spend a significant portion of time in homes in the vicinity of the landfill, and people who work near the landfill.

As reported in the 1990 census, the total population contained within the tracts surrounding the landfill is 35,101 persons (U.S. Department of Commerce, 1990b). The total population of the Cities of Monterey Park and Montebello is 59,570 and 60,740 persons, respectively.

There are two age groups within the overall population of particular sensitivity to environmental conditions: children under 5 years and adults 65 years or greater. The population of children under 5 years (2,307 persons) and adults 65 years or greater (4,047 persons) together comprise 6,354 persons, or approximately 18 percent of the population in the tracts surrounding the landfill.

Also of importance are persons who are likely to spend a significant portion of time at home in the tracts surrounding the landfill. This number was estimated from the 1990 census to be 13,863 persons, or approximately 39 percent of the population in the tracts surrounding the landfill (U.S. Department of Commerce, 1990b).

1.5 Surface Water Hydrology

This discussion of regional surface water hydrology includes major rivers, drainage patterns, and sources of infiltration such as spreading basins and irrigation. Surface water drainage at the landfill is also discussed.

1.5.1 Regional Hydrology

The regional drainage divide, as reported by the California Department of Water Resources (CDWR, 1966), that separates the Central Basin from the San Gabriel Basin runs directly through the northeast corner of the landfill. The San Gabriel Valley is drained by two major rivers, the Rio Hondo and San Gabriel River. Almost all natural surface water outflow from the San Gabriel Valley, including the Rio Hondo and San Gabriel River, passes through Whittier Narrows, located approximately 2 miles east of the landfill. After passing through

Whittier Narrows, both rivers extend southerly across the Los Angeles Coastal Plain to the Pacific Ocean.

There are numerous dams and spreading basins in the general vicinity of the OII Site that serve as locations for groundwater recharge. Whittier Narrows Dam lies on both the Rio Hondo and San Gabriel River. The area upstream of the dam is a wildlife refuge. Two major spreading grounds lie approximately 1 mile downstream of the Whittier Narrows dam, including the Rio Hondo Spreading Ground (on the Rio Hondo) and San Gabriel River Spreading Ground (on the San Gabriel River). Additional spreading grounds are located several miles upstream in the San Gabriel Valley.

1.5.2 Surface Water Drainage at the OII Site

Surface water present on and in the vicinity of the OII Site is limited to storm water runoff following substantial rainfall events. There are no natural streams on or adjacent to the landfill. Surface water (storm water) runoff from the South Parcel flows to lined swales on the inboard side of each terraced bench road on the landfill side slopes, where it is diverted to the storm water drainage system. Most runoff from the top deck and east, north, and west slopes drains through four main storm drains to concrete, trapezoidal drainage ditches paralleling the Pomona Freeway. Runoff from the south slopes flows through a series of smaller drains into the City of Montebello storm drainage system. All of the runoff gets routed through Los Angeles County storm drains to the rivers and ultimately discharges to the Pacific Ocean (LACDPW, 1987).

1.6 Geologic Setting Summary

Detailed discussions of the regional and site-specific geology are presented in the Draft Remedial Investigation Report (EPA, 1994c). The geologic units in the immediate vicinity of the OII Site are described briefly below.

The Pico Unit, the San Pedro Formation, the Lakewood Formation, and the younger (Holocene) fluvial/alluvial sediments are the geologic units present around the OII Site. The Lakewood and San Pedro Formations have been grouped together because of their similar hydrologic properties and difficulty in distinguishing them in the field.

In the OII Site area, the Pico Unit consists of siltstone; silty sandstone; and very fine-grained sandstone with interbedded medium- to coarse-grained sandstone, fine-grained conglomerate, and occasional marine limestone beds. The siltstone intervals are greater than 500 feet thick at some locations around the landfill; however, these intervals are probably made up of numerous siltstone layers, not one massive unit. The sandstone and conglomerate intervals range in thickness from a few inches to over 200 feet.

The Lakewood/San Pedro Formation unconformably overlies the Pico Unit in the OII Site vicinity. Within the landfill vicinity, the Lakewood/San Pedro Formation consists largely of poorly consolidated sandstones and conglomerates, with lesser amounts of siltstone. Generally, Lakewood/San Pedro sandstones are in contact with Pico Unit siltstones. However, in the eastern portion of the area, Lakewood/San Pedro Formation sandstones are in contact with Pico Unit sandstones. In other areas, such as the western portion of the landfill, Lakewood/San Pedro siltstone may be in contact with Pico siltstone.

The Holocene alluvium consists of unconsolidated sediments ranging in size from clay to cobbles and boulders. The alluvium typically occurs surficially and occupies the topographically low portions of the OII Site vicinity.

1.7 Hydrogeologic Setting Summary

Detailed discussions of the regional and site-specific hydrogeology are presented in the Draft Remedial Investigation Report (EPA, 1994c). Significant hydrogeologic units in the local vicinity of the OII Site include: Pico Unit deep siltstone, Pico Unit sandstones and conglomerates, Pico Unit shallow siltstone (termed the Shallow Silt Flow System in the area southwest of the South Parcel), and Lakewood/San Pedro Formation sandstone. The complex geologic conditions present in the OII Site vicinity (i.e., depositional environment, folding, faulting) have resulted in similarly complex hydrogeologic conditions. The hydrogeologic units and groundwater flow conditions vary considerably in different portions of the landfill.

Two deeper Pico Unit sandstone aquifer systems have been delineated: the South Aquifer and the West Aquifer. The South and West Aquifer Systems are confined beneath Pico Unit shallow siltstone at the western end of the South Parcel. The South Aquifer trends approximately northeast-southwest in a narrow elongated band along the southern boundary of the landfill, and does not appear to be laterally extensive in the northwest-southeast direction. It is unconfined to semiconfined along the southeastern and eastern boundaries of the South Parcel.

The West Aquifer has been detected only along the western boundary of the South Parcel. Although the downgradient extent of this unit is uncertain, it does not appear to be laterally extensive to the west.

Other semiconfined to confined Pico Unit sandstones and conglomerates occur in the vicinity of the North Parcel. These sediments do not appear to correlate with either the South or West Aquifers.

Pico Unit siltstone is generally referred to as Pico Unit deep siltstone when present below the South or West Aquifers. It is referred to as Pico Unit shallow siltstone near the water table and above the West Aquifer. The Pico Unit shallow siltstone is described as the Shallow Silt Flow System along the western and southern boundaries of the South Parcel for discussions of groundwater occurrence and groundwater flow conditions.

The depth to water in the landfill vicinity varies greatly, and ranges from about 15 to 20 feet at the southwestern corner of the South Parcel to over 200 feet at the southeastern corner of the landfill. In the western portion of the South Parcel, the groundwater table is near (or potentially in contact with) the waste prism. Under the center of the eastern end of the South Parcel, a boring drilled through the waste prism indicated water about 13 feet beneath the waste (OII Landfill Work Defendants, 1995b).

The estimated horizontal groundwater flow velocity in the shallow systems varies greatly in different units, ranging from approximately 0.3 to 1,810 feet per year (ft/yr). The higher estimated velocities are in the unconfined aquifer to the north of the South Parcel. These numbers may be artificially high if other factors such as restrictions in the shallow units are affecting the gradients. The lower velocity estimates are generally for flow in the shallow silt around the southwestern perimeter of the South Parcel. Flow in the silt may be several orders of magnitude higher in preferential flow paths such as fractures or more permeable lenses.

Water level measurements in wells located around the southwestern corner of the South Parcel indicate the presence of a groundwater mound. Because of the low permeability of the siltstone surrounding this area, recharge does not readily flow away from the landfill and therefore creates a localized groundwater mound. Groundwater flow in this area is generally radial, away from the landfill. It also appears that a groundwater mound has developed northeast of the landfill, probably due to irrigation at the Resurrection Cemetery and nurseries surrounding the northern boundary of the North Parcel. Recharge probably infiltrates through the thin Lakewood/San Pedro Formation but cannot readily infiltrate into the lower-permeability Pico Unit siltstones, thereby causing a mound to form.

There is no known use of groundwater within approximately 1.5 miles of the OII Site.

2.0 OII Site History and Enforcement Activities

2.1 Landfill History

This section presents a brief summary of information describing the historical waste disposal and landfill operations, landfill development and thickness, waste types and quantities disposed at the landfill, and landfill development.

2.1.1 Historical Waste Disposal and Landfill Operations

Prior to 1946, the OII property was a sand and gravel quarry. Waste disposal operations at the landfill began on 14 acres in October 1948 by Monterey Park Disposal Company. In January 1952, Operating Industries, Inc. assumed ownership of the landfill; and, by 1958, the landfill had expanded to 218 acres. The size was later reduced to 190 acres when the State of California purchased 28 acres for construction of the Pomona Freeway.

In October 1954, the California Regional Water Pollution Control Board No. 4, Los Angeles Region, first permitted disposal of liquids at the landfill (Resolution 54-15) (CRWPCB, 1954). In March 1976, the Los Angeles Regional Water Quality Control Board (formerly California Regional Water Pollution Control Board No. 4) limited disposal of liquids to a 32-acre area in the western portion of the South Parcel (Order No. 76-30) (LARWQCB, 1976a). This order allowed Operating Industries, Inc. to mix liquids with solid refuse at a ratio of 10 gallons per cubic yard of refuse. In September 1976, Order 76-133 (LARWQCB, 1976b) increased the allowable ratio to 20 gallons per cubic yard.

In 1982, leachate was observed seeping offsite (LARWQCB, 1984). Operating Industries, Inc. stopped accepting hazardous liquid waste in January 1983 and all liquid waste in April 1983. A leachate collection system was installed to collect leachate seeping from the landfill. Leachate generated at the landfill was collected and redisposed by combining it with incoming refuse that was mixed back onto the working face of the landfill (LARWQCB, 1984). This practice continued until September 1984, when the California Department of Health Services classified leachate generated at the landfill as hazardous and prohibited redisposal, effective October 1984. At that time, Operating Industries, Inc. began shipping all leachate offsite for treatment and disposal.

Prior to 1984, Operating Industries, Inc., the landfill operator and owner, performed several landfill control measures. This included installation of the leachate collection system, development of an air-dike air injection system on the west side of the landfill to control subsurface gas migration, installation of gas extraction wells around the perimeter of the landfill, installation of a gas flaring station to burn landfill gas, site contouring, slope terracing and vegetation, and covering of refuse with fill.

Operating Industries, Inc.'s control of the environmental problems and maintenance of the control systems began to diminish significantly in late 1984. In this same time period, EPA began initial site investigations. On May 19, 1986, Operating Industries, Inc. notified the state of its intent to discontinue all site control and monitoring activities except irrigation. By the end of May 1986, the OII Site was added to the National Priorities List. EPA assumed responsibility for site activities on May 20, 1986.

2.1.2 Landfill Development and Thickness

Landfilling operations began in 1948 by filling an existing natural canyon currently occupied by a portion of the Pomona Freeway and north-central portions of the South Parcel. Cut-and-cover filling operations began in the early 1950s. Additional areas were quarried and filled. From the 1950s through the 1970s, the waste disposal activities expanded to cover the current landfilled area. During this time, the height of the landfill was also increased several times, ultimately reaching the current elevation of approximately 640 feet above mean sea level. The thickness of solid waste in the South Parcel ranges from approximately 200 to 325 feet. The North Parcel contains approximately 11 acres of solid waste, ranging in thickness up to 55 feet.

2.1.3 Waste Types and Quantities

Examples of the types of wastes permitted for disposal at the landfill (Monterey Park Resolution 60-58) are listed in Table 1. Table 2 lists examples of liquid wastes reportedly disposed at the OII Site between 1976 and 1984 (EPA, 1987e). A total estimated refuse volume of 38 million cubic yards weighing 22 to 31 million tons was disposed at the landfill over its operating life (EPA, 1988g). More than three-fourths of the refuse was disposed before 1974, before records were maintained for truck counts and delivered weight.

Liquids are excluded from the refuse mass calculations discussed in the preceding paragraph. Liquid wastes were disposed at the landfill throughout its history, until April 1983. More than 300 million gallons of liquids are recorded as having been disposed between 1976 and 1983 (EPA, 1988d). Liquid wastes were reportedly disposed at the landfill prior to 1976, but records were not kept by landfill operators.

2.2 Field Investigations

A large number of field investigations have been performed at, and in the vicinity of, the OII Site over approximately the last 20 years. This section provides an accounting and brief description of the field investigations and monitoring programs that provided data used in geologic, hydrogeologic, and contaminant analyses and interpretations in the Remedial Investigation. Detailed discussions of these investigations are presented in the Draft Remedial Investigation Report (EPA, 1994c).

Section 2.2.1 discusses major hydrogeologic investigations. Section 2.2.2 briefly describes major geologic and geotechnical investigations that have been performed at the landfill.

Table 1
Examples of Generic Wastes Permitted for Disposal at OII Landfill
(Monterey Park Resolution 60-58)
OII Site Final Record of Decision

Natural earth
Rock, sand, and gravel
Paving fragments
Concrete
Brick
Plastic and plaster products
Steel mill slag
Clay base rotary mud
Mud cake from oil field sumps
Street sweepings
Glass
Asbestos fiber and products therefrom
Metals and metal products except magnesium and its alloys
Paper and paper products including roofing and tar paper
Cloth and clothing
Wood and wood products
Lawn clippings, sod, and shrubbery
Cold ashes
Manufactured rubber products
Solid plastic products
Paint sludge received from water-circulating paint spray booths not transported in vacuum tanks
Rotary drilling mud from oil field drilling operations
Cleanings from production tanks
Acetylene sludge
Sludge from automobile wash racks and steam-cleaning products
Mud and water from laundries
Liquid latex waste
Ceramic, pottery, and glaze wastes
Lime and soda water
Paint sludge recovered from water circulated in paint spray
Water containing not more than 0.5 percent molasses
Market refuse (in limited quantities)
Not permitted for disposal (Monterey Park Resolution 60-58): spent acid waste, spent caustic waste, and common chemically stable salts from manufacturing or industrial processes.
Reference: EPA (1987e)

Table 2
Examples of Liquid Wastes Reportedly Disposed at OII Landfill from 1976 to 1984
OII Site Final Record of Decision

(Percent figures are approximate values based on general descriptions appearing on OII Monthly Reports to the LARWQCB)

Mud and water	60%
Mud, water, and oil	12%
Drilling mud	4%
Tank bottom	6%
Latex wastes	2%
Paint sludge	2%
Coolant	1.5%
Carbon black and water	1%
Remaining generic types	11.5%

Alkaline solution	Lint and water
Aluminum sludge and flocculent	Liquor
Animal fat and water	Metal dust and water
Asbestos pulp and water	Mineral water
Asphalt and water	Molasses and water
Brake fluid	Nickel, copper, and water
Brine	Oxides (Al, Pb, Si, Zr)
Burnishing media	Organic wastes
Burner (baghouse) dust	Perlite
Carpet material and water	Petroleum industry sludge
CAT CR catalyst	Plastic dust
Caustic soda	Polymer sludge
Caustic solution	Rain water
Cement and water	Resin, PVC, and water
Ceramic glaze	Rouge and water
Cleaning compound	Rust sludge
Coconut	Sand and water
Corn syrup	Sawdust and water
Creosote	Settling basin sludge
Dairy wastes	Slurry
Diamogion silica	Soap and water
Dough and water	Sodium silicate
FCC fines and water	Starch and water
Fiberglass	Stretford solution
Film gelatin	Sulfur fines in water
Filter clay	Tank sludge
Fish and water	Tar pit sludge
Food-processing wastes	Tile glaze
Glass dust and water	Waste paper
Glue and water	Wastewater
Grease waste and water	Wax (polishing compound) and water
Ink and water	Welding flux
Lime and water	

Reference: EPA (1987e)

Section 2.2.3 summarizes two air quality investigations performed in the vicinity of the landfill. Section 2.2.4 briefly summarizes surface water sampling at the landfill. Finally, Sections 2.2.5 and 2.2.6 describe investigation and sampling of leachate and landfill gas, respectively.

2.2.1 Hydrogeologic Investigations

EPA performed six major hydrogeologic investigations at the OII Site between 1975 and 1993, resulting in the installation of 75 groundwater monitoring wells. Monitoring well locations are shown in Figure 3. Activities conducted as part of these investigations include: drilling and monitoring well installation, formation testing, surface and subsurface soil sampling, groundwater sampling and analysis, and aquifer testing. Data from the hydrogeologic investigations were used extensively throughout the Remedial Investigation.

2.2.2 Geologic and Geotechnical Investigations

EPA performed several geologic and geotechnical investigations that provide additional information regarding the subsurface conditions at or near the OII Site. A brief summary of these follows.

Geologic Mapping and Investigations. There are several published papers and reports pertaining to the geologic conditions in the vicinity of the OII Site. Additionally, EPA conducted focused geological mapping at the OII Site and the surrounding area during several investigations. Also, the OII Landfill Work Defendants have performed geologic mapping of the OII Site and vicinity.

Geotechnical Investigations. EPA performed numerous geotechnical studies related to landfill development, residential and commercial property development, petroleum exploration, and the underground storage of imported natural gas in the vicinity of the OII Site. Geotechnical investigations within the landfill boundary have typically been related to landfill development and construction; these investigations primarily include geologic mapping, material testing, and landfill characterization relative to slope stability and foundation investigations. EPA drilled numerous borings to define the limits of the waste prism and to investigate the type and extent of contamination or landfill gas migration. Since 1987, EPA has conducted geotechnical monitoring of slope stability, including measurements of inclinometers and surveying of surface monuments.

North Parcel Site Characterization. In 1987, EPA performed a surface and subsurface soil investigation at the North Parcel to identify the vertical and lateral soil contamination and the extent of waste on the North Parcel (EPA, 1988i). EPA collected surface soil samples from throughout the auto salvage yard and drilled borings for waste characterization. Shallow and deep soil samples were obtained from all of the borings.

2.2.3 Air Quality Investigations

EPA conducted two air quality investigations as part of the Remedial Investigation for the OII Site. One investigation focused on ambient air in the vicinity of the landfill, and the other investigation focused on air quality in the homes surrounding the landfill.

24-Hour Ambient Air Monitoring. EPA conducted an investigation to collect and analyze ambient outdoor air samples in the vicinity of the landfill (EPA, 1991c). Ambient air sampling was conducted for one year, from September 1989 to September 1990. EPA installed nine air monitoring stations for the study; seven were located along the perimeter of the landfill, and two were located some distance away from the landfill to serve as background locations. Sampling locations are shown in Figure 4.

In-Home Air Monitoring. Between November 1992 and July 1993, EPA conducted an in-home air monitoring program to evaluate whether potentially harmful landfill gas from the OII Site was entering nearby homes (EPA, 1993a). EPA recommended the in-home air monitoring program at the conclusion of the year-long ambient air study described above. EPA used existing methane data from monitoring of water meter boxes and probes to establish the target area for residential sampling. The sampling program included homes along the streets adjacent to the southern boundary of the landfill as well as a small area west of the landfill. EPA took air samples from a total of 197 homes; the locations of these homes are identified in Figure 5.

2.2.4 Surface Water Sampling

Surface water in the form of runoff from the landfill is sampled routinely as part of the site control and monitoring activities at the landfill. In addition, EPA collected two surface water runoff samples from the North Parcel in 1987 as part of a field reconnaissance to identify surface drainage features.

Routine surface water sampling began in February 1990 and continues through the present. For the first three (or more, in some instances) storms of the rainy season, EPA performs surface water sampling within several hours after the start of a storm at designated sampling locations. The majority of the surface water sampling results are included in OII Landfill Work Defendants monthly reports (OII Landfill Work Defendants, 1990 to 1994).

2.2.5 Leachate Investigations

This section provides a brief overview of investigations that have been performed to delineate and characterize leachate at the OII Site.

09-23-96

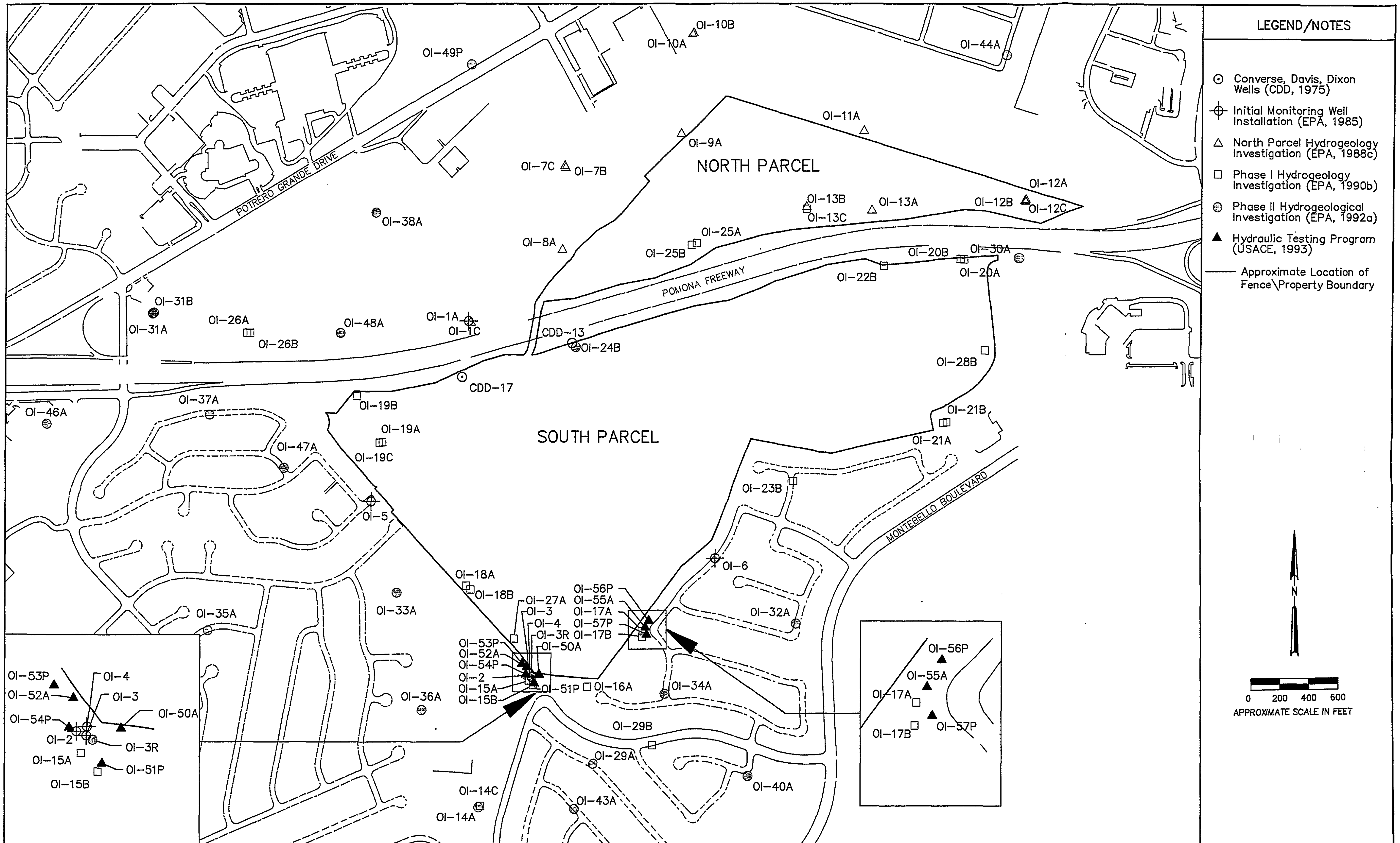


Figure 3
Monitoring Well Locations
OII Site Final Record of Decision

I:\PROJECTS\109994.16\109994-1.DWG

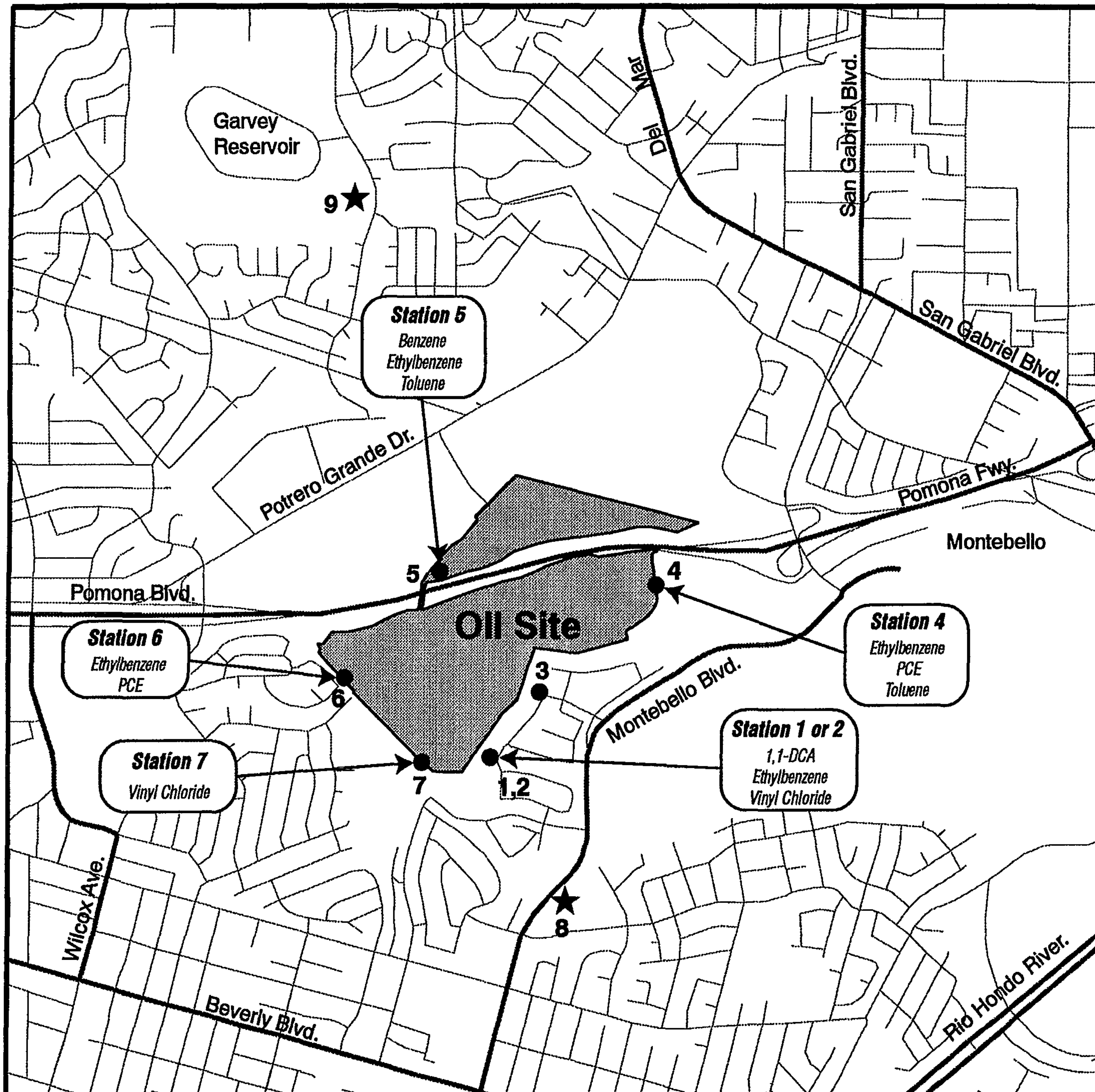


Figure 4
Compounds With Average Ambient Air Concentrations Exceeding Background (at the 85 percent significance level)
Oil Site Final Record of Decision

m1109994.16.01 comps 8/96

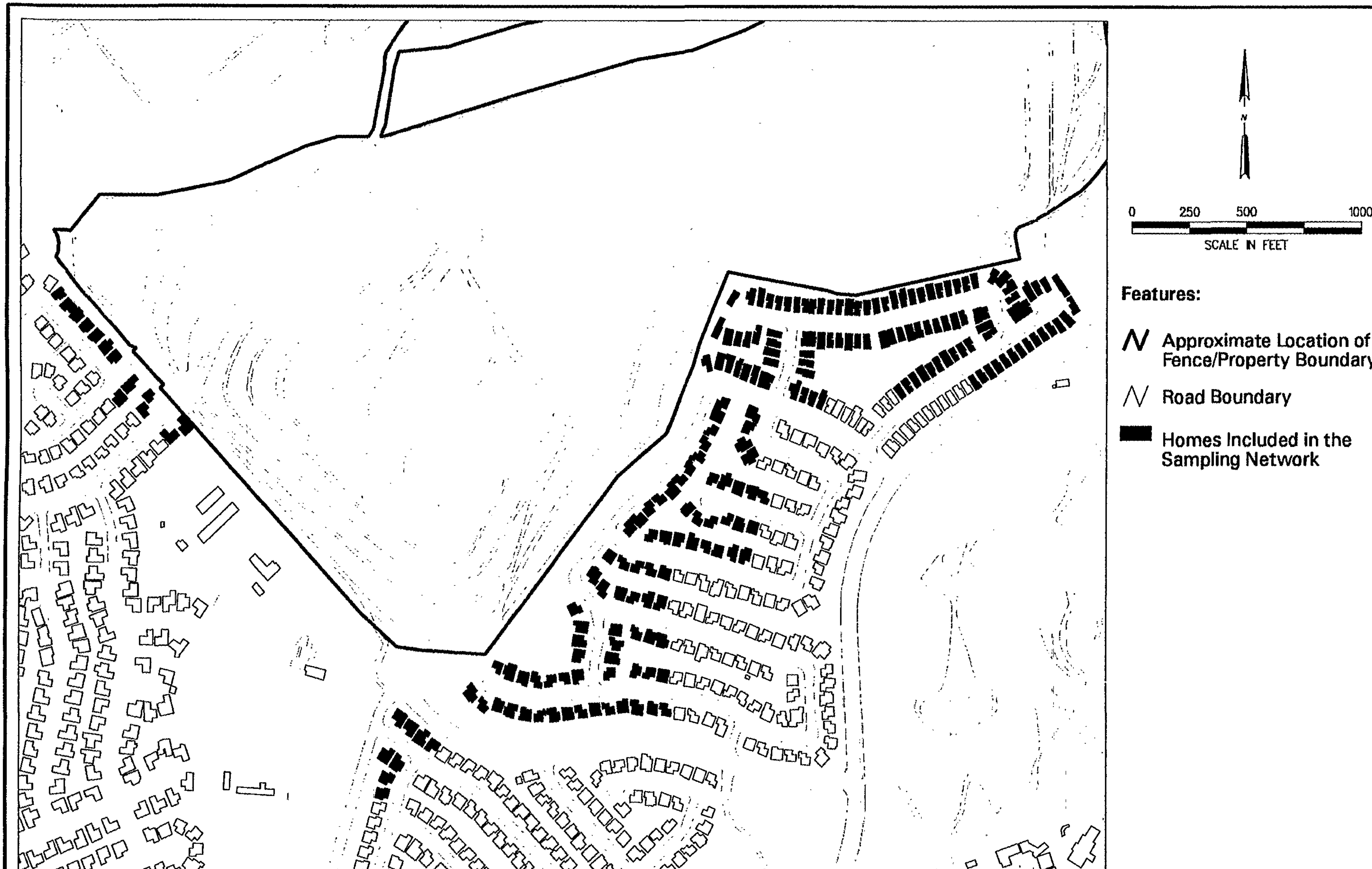


Figure 5
Sampling Network for the In-Home Air Monitoring Program

OII Site Final Record of Decision

Leachate Seeps Sampling and Analysis. EPA collected leachate samples from leachate seeps in Iguala Park after heavy rains in January 1993. The OII Landfill Work Defendants performed a survey of onsite landfill seeps after the 1992/1993 rainy season to prioritize seepage areas for potential remediation prior to installation of the landfill cover (OII Landfill Work Defendants, 1993a).

Leachate Sampling and Analysis. Since 1983, EPA has periodically collected and analyzed leachate to characterize its chemical composition and source areas. EPA performed its first comprehensive analyses of leachate chemistry in 1986 (EPA, 1986a), and conducted several leachate sampling programs between 1986 and 1989. Liquid samples were collected from various locations in the leachate and landfill gas collection systems on the South Parcel, including sumps, wells, tanks, and two deep interior landfill gas extraction wells. EPA also measured liquid levels in 17 landfill gas extraction wells on the top deck of the landfill.

During soil boring drilling at the North Parcel (EPA, 1988i), EPA collected perched liquids from two borings located in the southwest portion of the North Parcel landfill area. These liquids were encountered at the transition between waste and the underlying native soil.

Since 1990, the OII Landfill Work Defendants have performed several leachate sampling events associated with evaluations of leachate quantity and quality for the leachate treatment plant. Samples have been collected primarily from gas collection and leachate wells, as well as the sumps associated with the leachate collection system.

2.2.6 Landfill Gas Investigations

EPA has collected a large amount of landfill gas data at the OII Site since the mid-1970s. This section provides a brief overview of the major sources of data most relevant to analyses in the Remedial Investigation and Feasibility Study.

Landfill Gas Probes and Wells. Operating Industries, Inc. installed landfill gas monitoring probes along the west, south, and east borders of the South Parcel in 1976 and 1981 and around the North Parcel in 1981. Operating Industries, Inc. installed perimeter gas extraction wells in various phases from 1982 through 1984. Many of the landfill gas probes continue to be monitored routinely for methane and other constituents as part of the ongoing site control and monitoring activities.

Air Dike Wells. In response to a Los Angeles County Health Department order (January 23, 1981), Operating Industries, Inc. installed an air dike system in native material along the south and west borders of the landfill to control landfill-generated methane gas emissions beyond the landfill boundary. EPA installed 26 wells in 1981 to create the air dike. Additional wells and monitoring probes were installed in October 1982. EPA constructed eight gas migration test wells (GMTW-1 through -8) to a maximum depth of 101 feet as part of a testing program for the existing air dike system (OII Landfill Work Defendants, 1992b).

South and North Parcel Landfill Gas Monitoring Wells. EPA installed 15 landfill gas monitoring wells along the western and southern boundaries of the South Parcel in 1987 and 1988 (EPA, 1988h). EPA also installed multiple gas probes in each borehole at various depths, with bentonite seals between the probe levels.

EPA installed 13 landfill gas monitoring wells on the North Parcel in June/July 1987 (EPA, 1987d). Each well contains either two or three probes at depths between 6 and 64 feet. Locations and probe depths for both North and South Parcel landfill gas monitoring wells are shown in Figure 6.

2.3 Summary of EPA Actions at the OII Site

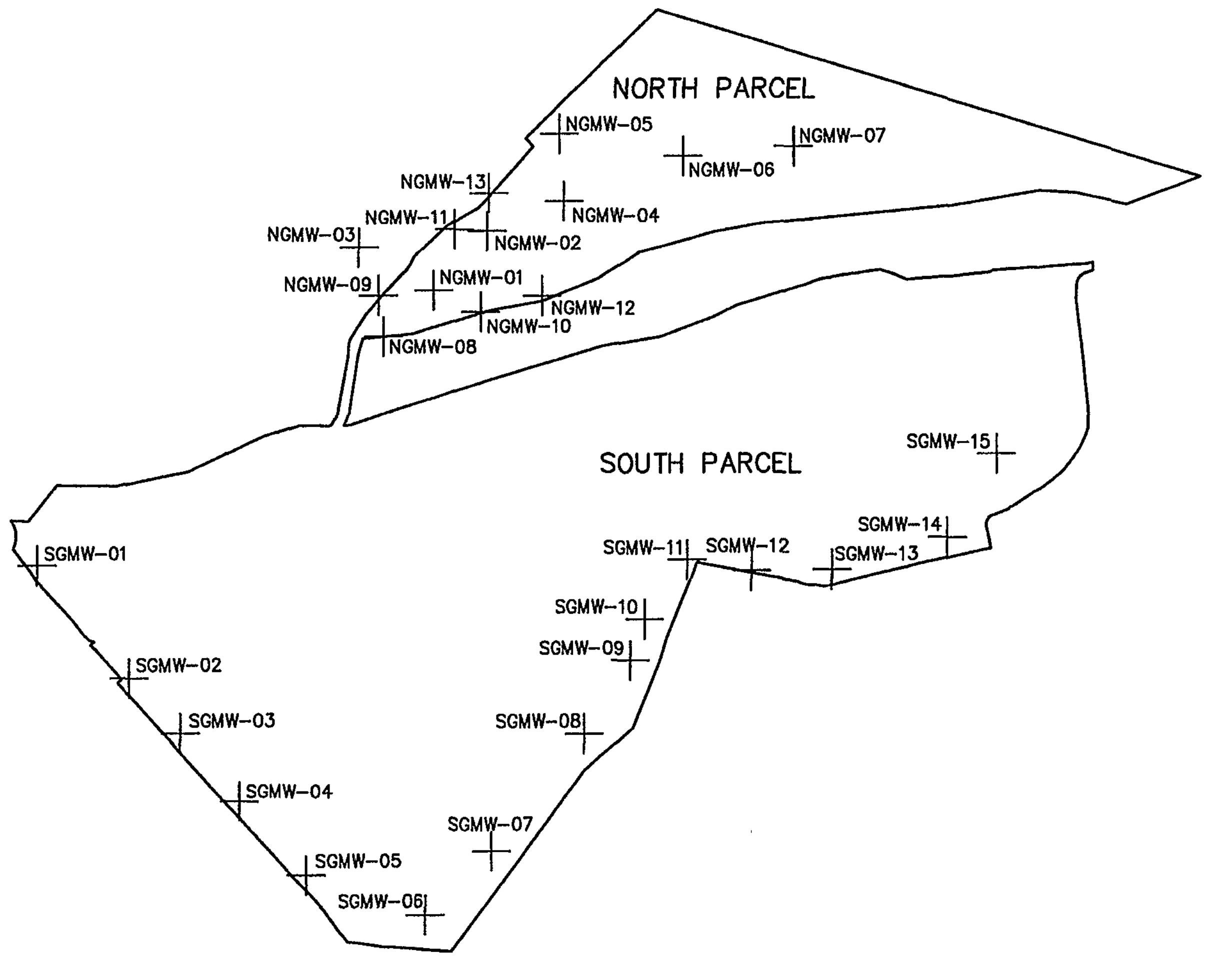
EPA has performed a variety of emergency actions in response to environmental problems at the landfill, including erosion control improvements, installation of a toe buttress for slope stability, surface runoff and drainage improvements, rehabilitation of the main flare station, site security, placement of vented water meter box covers in the areas surrounding the landfill, and installation of control systems in nearby affected residences.

EPA formally began the Remedial Investigation/Feasibility Study at the OII Site in 1986, although field investigations had been initiated in 1984. To efficiently manage the problems at the OII Site and to address the most apparent environmental problems prior to implementation of the final remedy, EPA divided the work into three operable units, as described below. EPA has successfully negotiated five Consent Decrees with various potentially responsible party groups to perform and fund portions of the work specified in the previous RODs for the operable units. In addition, some of the funds from the last two Consent Decrees are to go towards final remedy.

2.3.1 Summary of Enforcement Activities

Prior to EPA involvement, various state and local agencies reported that Operating Industries, Inc. frequently violated waste disposal regulations during the operations at the landfill between 1952 and 1984. Operating Industries, Inc. was notified and/or cited for several of these violations. EPA sent Resource Conservation and Recovery Act of 1976 (RCRA) Section 3007/Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) Section 104(e) notice letters and information requests to Operating Industries, Inc. and individual owners in 1984.

There are approximately 3,950 potentially responsible parties at the OII Site. Since 1984, EPA has sent combined general notice and CERCLA 104(e) letters to potentially responsible



LEGEND/NOTES

Approximate Location of Fence\Property Boundary

Landfill Gas Monitoring Well Locations

* Correspondance between as-built designation and current field designation is uncertain or unknown.

Figure 6
Landfill Gas Monitoring Well Locations
OII Site Final Record of Decision

I:\PROJECTS\109994.16\109994-2.DWG 09-23-96

parties that generated approximately 87 percent (by volume) of the manifested liquid waste for which EPA has records. Various groups of these potentially responsible parties participated in the Consent Decrees described below. The remaining 13 percent of the manifested liquid wastes, reflected in EPA's records, was generated by approximately 3,600 *de minimis* generators.

2.3.2 OII Site Operable Units

The term "operable unit" refers to a discrete action taken at a Superfund site to address specific site problems. At the OII Site, Operable Unit No. 1 pertains to site control and monitoring activities; Operable Unit No. 2 pertains to leachate management; and Operable Unit No. 3 pertains to landfill gas control and landfill cover. EPA has completed individual feasibility studies and signed RODs for each of the three operable units.

Operable Unit No. 1: Site Control and Monitoring. This operable unit addressed the seven major interim environmental control systems and activities at the OII Site that require operation, maintenance, inspection, and monitoring on a continuous basis: gas extraction and air dike systems, leachate collection system, irrigation system, access road system, storm water drainage system, site security, and slope repair and erosion control. In the ROD for Site Control and Monitoring (EPA, 1987a), EPA decided that full-time site control and monitoring should be undertaken, providing daily operation, repair and replacement of control system components when necessary, and system improvements. The ROD for Site Control and Monitoring is interim and ends at the signing of this ROD, although activities required under the Site Control and Monitoring ROD will continue as part of this ROD.

Operable Unit No. 2: Leachate Management. EPA's interim selected remedy for management of leachate collected at the OII Site, as presented in the ROD for the Leachate Management Operable Unit (EPA, 1987b), was treatment of the leachate at a treatment plant located at the landfill. This plant has been built on the North Parcel and consists of a Remote Oil Separation Facility (on the South Parcel), influent storage and equalization, biological reactors, chemical precipitation, sand filtration, granular activated carbon adsorption, effluent storage and discharge, a foul air system, a storm water holding system, and a sludge disposal system. The ROD specified that treated leachate be disposed in facilities operated by the County Sanitation Districts of Los Angeles County. The ROD for Leachate Management is interim and ends at the signing of this ROD, although activities required under the Leachate Management ROD will continue as part of this ROD.

Operable Unit No. 3: Gas Migration Control and Landfill Cover. The Gas Migration Control and Landfill Cover ROD, as amended (EPA, 1990a; originally the Gas Migration Control ROD [EPA, 1988b]), defines a final landfill cover and landfill gas migration control remedy to collect and destroy landfill gas that would otherwise be released from the landfill. (The Gas Migration Control and Landfill Cover ROD is referred to as the Gas Control and Cover ROD throughout this document.) In general, the work specified in the Gas Control and Cover ROD includes design, construction, operation, maintenance, and monitoring of a landfill gas control system; a landfill cover system; and a surface water management system for the OII Site. The new landfill gas system will likely supplement, partially incorporate, and partially replace the existing landfill gas system. The amendment to the ROD also includes design and construction of a landfill cover to reduce surface emissions of landfill gas, reduce oxygen intrusion into the refuse, reduce surface water infiltration, minimize slope erosion, and improve aesthetics. The Gas Control and Cover ROD is a final ROD and, as such, is a significant component of the final site cleanup, but is not included in or modified by this ROD.

2.3.3 OII Site Consent Decrees and Administrative Orders

Five Consent Decrees have been successfully negotiated with various potentially responsible party groups for performance and funding of various portions of the site cleanup. The first Partial Consent Decree was negotiated for work on Operable Units No. 1 and 2. The Second Partial Consent Decree was negotiated with additional potentially responsible parties to provide funding for the same scope of work as the first Partial Consent Decree. The Third Partial Consent Decree was negotiated for the design and implementation of a major portion of Operable Unit No. 3. The Fourth and Fifth Partial Consent Decrees provide additional funding for ongoing or planned work at the site.

In addition to the Consent Decrees, site cleanup work has been performed under a Unilateral Administrative Order (Unilateral Administrative Order No. 94-01) that EPA issued to three of the previously nonsettling potentially responsible parties. The order required these potentially responsible parties to participate in the collection and treatment/disposal of wastes associated with the OII Site in cooperation with the potentially responsible parties performing work at the site under the Consent Decrees. These three parties subsequently joined the Fifth Partial Consent Decree. Parties responsible for performing work under a Consent Decree are collectively referred to as OII Landfill Work Defendants throughout this ROD.

3.0 Highlights of Community Participation

The Proposed Plan for this remedy, in the form of a fact sheet, was distributed to approximately 3,000 parties on EPA's mailing list for the OII Site. The Proposed Plan, together with the Feasibility Study Report (EPA, 1996) and the Draft Remedial Investigation Report (EPA, 1994c), were also made available in the site vicinity at the Bruggemeyer Memorial Library in Monterey Park, the Montebello Regional Library in Montebello, and the Chet Holifield Library in Montebello. Microfilm of the entire Administrative Record File, containing these three documents and other documents considered or relied upon in developing the Proposed Plan, is available at the Bruggemeyer Memorial Library. The file is also available at EPA's Regional Office in San Francisco.

Notice of public meeting, availability of the Proposed Plan, and the announcement of a 30-day public comment period were published in the Los Angeles Times newspaper, San Gabriel edition, on May 31, 1996, and the Monterey Park Progress and Montebello News newspapers on May 30, 1996.

EPA held a public meeting on June 12, 1996, near the site to discuss its cleanup plan. At this meeting, EPA representatives made a brief presentation of the Proposed Plan, answered questions, and solicited comments from members of the public. A transcript of the public meeting, including oral comments and responses, is included as Appendix A of this ROD.

EPA extended the public comment period in response to a request from members of the public. A public notice mailed to the entire EPA mailing list extended the original 30-day public comment period to 60 days. EPA received several sets of written comments during the public comment period. These comments are addressed in the Responsiveness Summary, included as Part II of this ROD.

EPA has also held frequent meetings with the public, the state, and local agencies to discuss ongoing activities at the landfill. In addition to the Proposed Plan fact sheet for this remedy, EPA has issued numerous fact sheets between 1985 and 1996 describing investigation and cleanup activities at the OII Site.

This decision document presents the selected remedial action for the OII Site, in Monterey Park, California, chosen in accordance with CERCLA, as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The decision for this site is based on the Administrative Record.

4.0 Summary of Site Characteristics

This section summarizes results from environmental sampling conducted at the OII Site during the Remedial Investigation. The nature and extent of landfill-related contamination in air, soil, surface water, and groundwater are discussed.

4.1 Air

EPA conducted a year-long outdoor ambient air study at the OII Site in 1989 and 1990. In 1992 and 1993, EPA implemented an in-home air monitoring program at homes near the OII Site. Results of these programs are summarized below.

4.1.1 Ambient Air

EPA installed nine air monitoring stations for the ambient air study (Figure 4). Seven of the stations were set up to collect samples from air near the boundary of the landfill, and two stations were installed away from the landfill for comparisons to background air.

A statistical evaluation of the results indicated that average concentrations of selected volatile organic compounds adjacent to the landfill exceeded average background concentrations (Figure 4). The stations where at least one volatile organic compound exceeded background are shown in Figure 4. These data indicate that the landfill is impacting air adjacent to the landfill boundary.

4.1.2 In-Home Air

Based on the results of the ambient air study, EPA implemented an in-home air monitoring program to estimate the levels of landfill gas in air inside and outside (ambient) homes near the OII Site. The primary focus of the in-home air monitoring program was to determine whether landfill gas was entering homes through their foundations. EPA measured vinyl chloride in the in-home air study to evaluate landfill gas impacts. EPA collected samples from 197 homes in the neighborhoods surrounding the landfill. Locations of these homes are shown in Figure 5. Vinyl chloride was detected in about 20 percent of the 197 homes sampled, and was only near or exceeded the OII Site-specific action level of 1 part per billion in approximately 4 percent of the homes. Seven homes were determined to require interim gas control measures, which EPA subsequently installed. Supplemental sampling confirmed the effectiveness of the interim gas control systems.

4.2 Soil

EPA collected samples of both surface and subsurface soil at and in the vicinity of the OII Site during several field efforts conducted during the remedial investigation.

The primary soil investigations were conducted on the North Parcel and along the perimeter of the South Parcel. The surface soil investigation along the South Parcel perimeter also included collection of sediment samples from drainages leading away from the landfill.

4.2.1 Surface Soil

Along the perimeter of the South Parcel and on the North Parcel, EPA found isolated, low-level contaminant concentrations in surface soil and sediment. In three areas of limited extent, the concentrations exceeded both preliminary remediation goals (health-based concentrations that are used for risk screening purposes as possible "triggers" for further evaluation) and background concentrations. However, the baseline risk assessment results (summarized in Section 5) indicate that risks associated with this surface soil/sediment are not sufficiently elevated to warrant action for the protection of human health.

4.2.2 Subsurface Soil

In general, only isolated occurrences of contaminants were detected in subsurface soil samples. Along the perimeter of the South Parcel, results indicate that the higher contaminant levels found in subsurface soil samples are in areas where shallow groundwater contamination has also been detected. These areas include the western and southwestern perimeters of the South Parcel and the northeastern corner of the South Parcel. These subsurface samples were collected from greater than 10 feet below ground surface, which is typically the maximum depth evaluated in human health risk assessments.

4.3 Surface Water

Surface water present on and in the vicinity of the OII Site is limited to storm water runoff following substantial rainfall events and periodic irrigation runoff. Storm water runoff samples are routinely collected from all drainages leaving the OII Site. Detections of organic and inorganic constituents in surface water samples occur only sporadically and at generally low concentrations. The surface water management systems to be implemented under the Gas Control and Cover ROD will virtually eliminate the potential for surface water contamination.

4.4 Groundwater

This section provides a summary of pertinent information regarding groundwater contamination originating from the OII Site. The following nature and extent of contamination discussions are divided by general geographic areas and/or aquifers (see Figures 7 and 8).

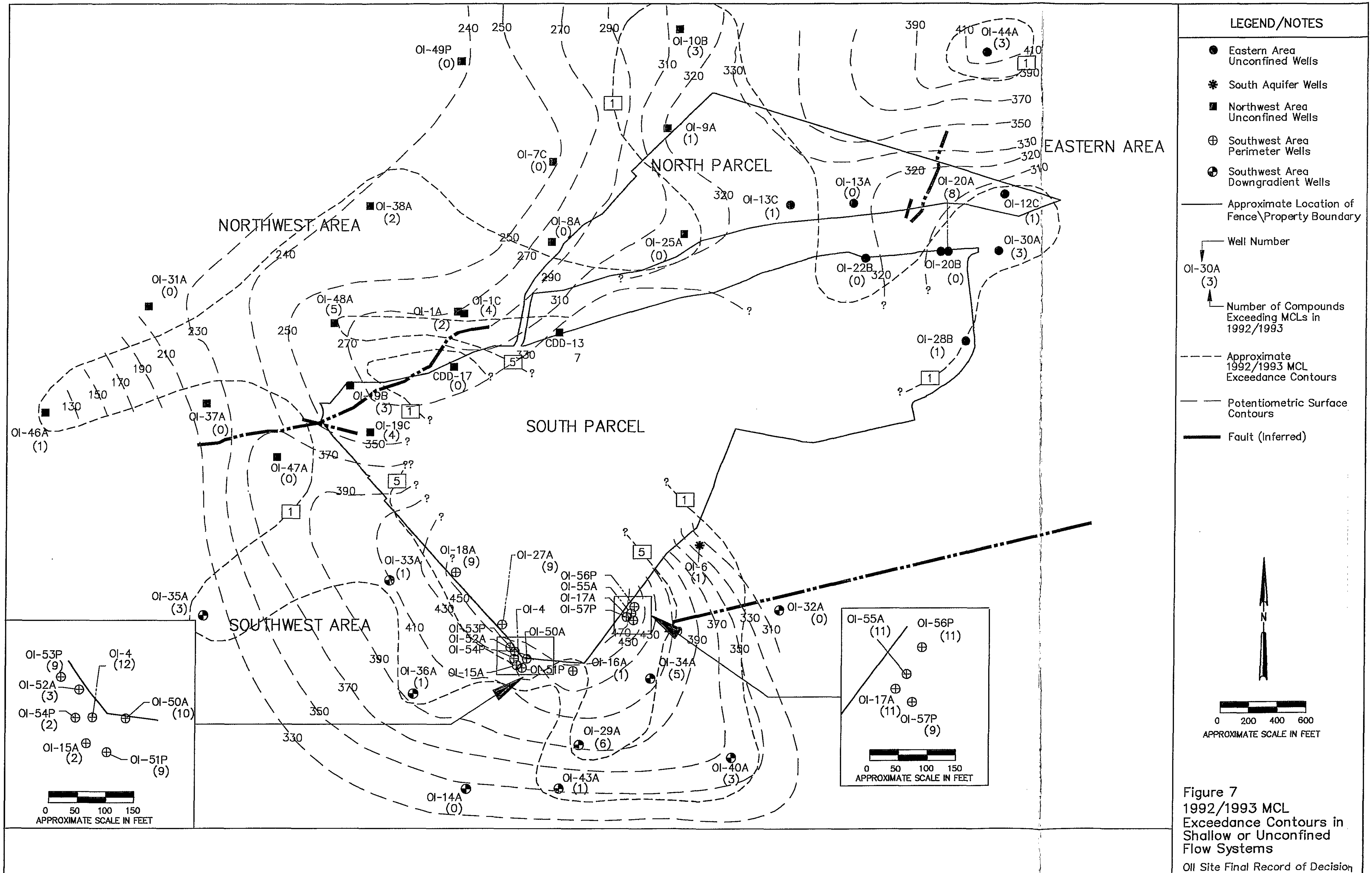


Figure 7
1992/1993 MCL Exceedance Contours in Shallow or Unconfined Flow Systems
OII Site Final Record of Decision

I:\PROJECTS\109994.16\109994-3.DWG 09-23-96

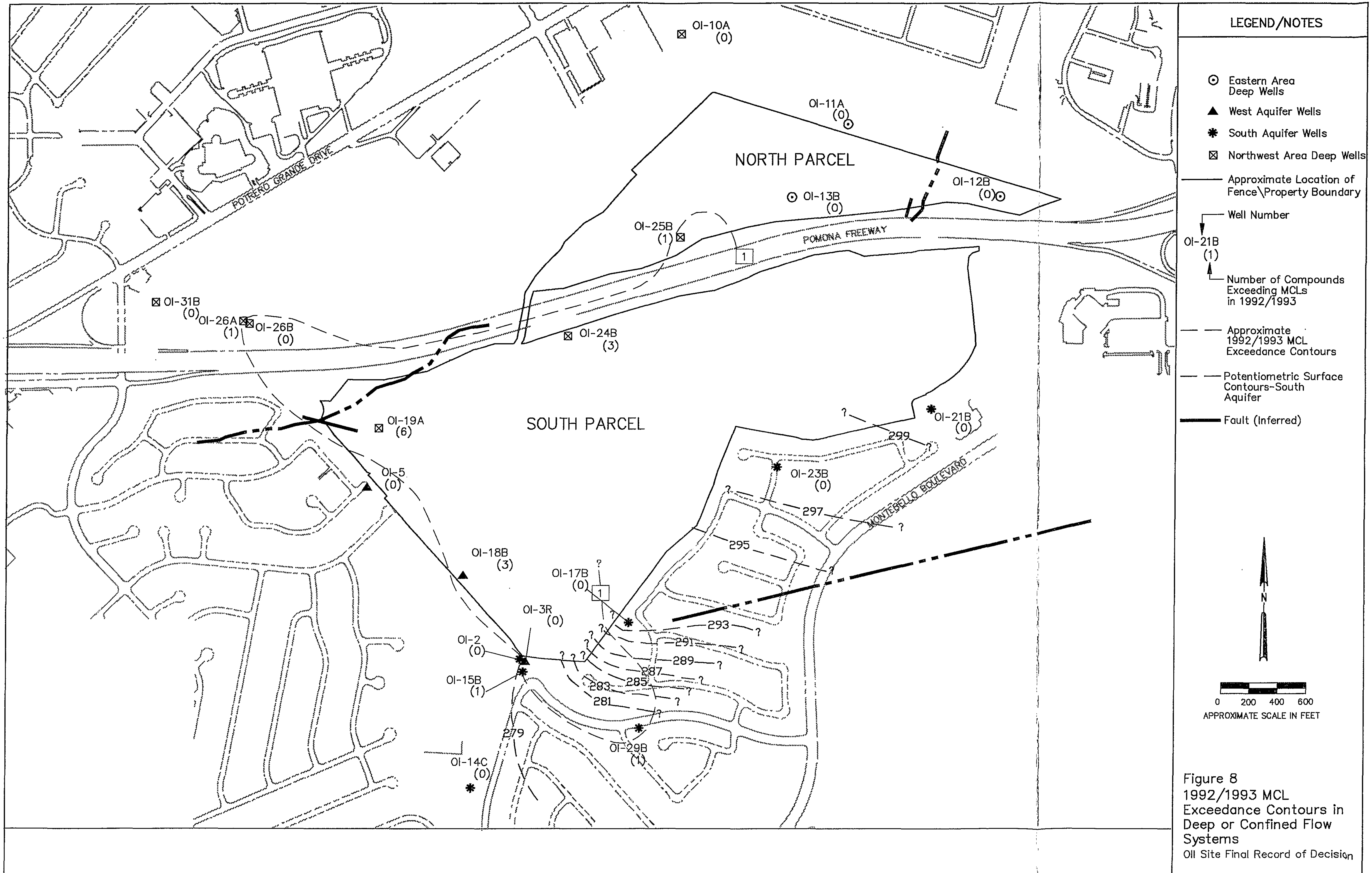


Figure 8
1992/1993 MCL Exceedance Contours in Deep or Confined Flow Systems
OII Site Final Record of Decision

I:\PROJECTS\109994.16\109994-4.DWG 9-23-96

The discussion of the nature and extent of groundwater contamination presented below is summarized from the Draft Remedial Investigation Report (EPA, 1994c) and is based on data from the 1992/1993 monitoring period. The Draft Remedial Investigation Report also provides an in-depth evaluation of all groundwater data collected from 1984 to 1993. For the Feasibility Study Report (EPA, 1996), groundwater quality data from 1994 were also evaluated to identify areas of concern for groundwater and to see if any significant changes had occurred.

4.4.1 Northwest Area

The Northwest Area encompasses the western portion of the North Parcel, the northwest portion of the South Parcel, and the area downgradient (northwest and west) of the two parcels.

Nature and Extent of Groundwater Contamination. EPA evaluated the groundwater contamination in the Northwest Area using the 1992-1993 maximum contaminant level (MCL) exceedances, shown in Figures 7 (shallow or unconfined flow systems) and 8 (deep or confined flow systems).

- 1992-1993 maximum contaminant level exceedances (Figure 7) indicate the presence of one contaminant plume moving approximately due west along the northern boundary of the South Parcel and a second area of contamination on and north of the North Parcel.
- It appears that contaminants exiting the landfill near Wells CDD-13 and OI-19B enter groundwater, which then migrates toward Well OI-46A. This westerly plume is consistent with the groundwater flow directions presented in Figure 7.
- Data from the deeper units in this same area (primarily Wells OI-19A and OI-24B), shown in Figure 8, also show maximum contaminant level exceedances indicating deeper groundwater contamination in the vicinity of the shallow plume source areas.

Contaminant Fate and Transport. Conclusions regarding contaminant transport from the landfill into and through groundwater in the Northwest Area are summarized below.

- The potential physical pathways for contaminants to migrate from the landfill and into the groundwater in this area may be through several small canyons that were excavated prior to the establishment of the landfill and subsequently filled with refuse. These canyons were located approximately along the present northern boundary of the South Parcel. The lithology of basal rock in these canyons is silty sandstone and siltstones that are probably less permeable than the overlying waste or fill material. This permeability contrast can direct flow from the interior sections of the landfill outward towards the north-northwest.

- While most of the contaminant transport will likely be through the unconfined aquifer system, some migration also occurs through siltstones and deeper, confined units.

4.4.2 Southwest Area—Groundwater Contamination

The Southwest Area refers to the area around the western, southwestern, southern, and southeastern boundaries of the southwestern corner of the South Parcel.

Nature and Extent of Groundwater Contamination. EPA evaluated groundwater contamination in the Southwest Area using the 1992/1993 MCL exceedances, as shown in Figures 7 and 8. As shown in these figures, the perimeter wells exhibit numerous maximum contaminant level exceedances. These data indicate at least two shallow plumes migrating from the Southwest Area of the landfill (Figure 7). The following observations have been made regarding the groundwater plumes.

- The contaminant levels at the fringes of the monitoring well network indicate that impacted water is not likely present considerable distances further downgradient (i.e., less than a few hundred feet beyond the current monitoring wells).

- The west-southwest plume extends at least to Well OI-35A, located about 1,800 feet from the landfill boundary. Contamination present this far downgradient in the Shallow Silt Flow System is not consistent with the horizontal flow velocities calculated for the Shallow Silt Flow System, and is likely indicative of preferential flow through higher-velocity features in the siltstone matrix (such as fractures or sandier intervals) or along the contact between the Lakewood/San Pedro and Pico Units.

- The primary source of contamination in the Southwest Area appears to be subsurface releases along the borders of the landfill.

Contaminant Fate and Transport. Conclusions regarding contaminant transport from the landfill into and through groundwater in the Southwest Area are summarized below:

- The primary pathway for contaminant transport from the landfill into the surrounding regions of the Southwest Area is subsurface releases along the borders of the landfill and subsequent horizontal migration of contaminants through the siltstone, fractures, and sandier intervals in the Shallow Silt Flow System. Additionally, contaminants can migrate directly into groundwater in the Lakewood/San Pedro/Fill unit at the southwest corner of the landfill.

- Following wet periods, contaminated groundwater flow is possible along the contact between the Lakewood/San Pedro Formation (or the Lakewood/San Pedro/Fill unit) and the Shallow Silt Flow System, given the permeability contrast between the two.

- Although there are high contaminant concentrations near the landfill perimeter in the Southwest Area (particularly of organic constituents), migration through the siltstone causes organic constituents to be retarded and concentrations to decrease considerably with distance from the perimeter of the landfill.

- Migration through the siltstone causes organic constituents to be retarded and concentrations to decrease considerably with distance from the perimeter of the landfill. The semivolatile organic compounds are even more retarded that the volatile organic compounds and are not expected to transport as quickly away from the landfill because of their generally high retardation rates. Outside Well OI-35A, there are very few organic compounds detected at the fringes of the shallow plumes in the Southwest Area.

4.4.3 Eastern Area—Groundwater Contamination

The Eastern Area comprises the area to the north, east, and south of the eastern portion of the South Parcel and the area to the north and east of the North Parcel.

Nature and Extent of Groundwater Contamination. The 1992/1993 combined maximum contaminant level exceedances, shown in Figures 7 and 8, indicate one anomalous well and one shallow plume. The following observations have been made regarding groundwater contamination in this area:

- The anomalous well is Well OI-44A, which has three maximum contaminant level exceedances. (This well is anomalous because it appears to have contamination of the type associated with the landfill, but is located upgradient of the landfill according to the available groundwater data.) However, the hydraulic relationship between this well and other wells closer to the landfill in the Eastern Area is not well understood.

- The contaminant plume appears to be small and shallow, moving to the east from the northeast corner of the South Parcel toward Well OI-30A and potentially Well OI-12C. This plume is primarily organic, but does contain inorganic constituents as well. The lack of organic compounds in the other unconfined wells outside Wells OI-20A and OI-30A (located about 400 feet downgradient of Well OI-20A) indicates that the extent of organic contamination in the Eastern Area is limited.

- Based on the suite of contaminants detected in Well OI-20A, it is apparent that liquid-borne contaminants in the northeast corner of the South Parcel are the source of the Well OI-20A plume. However, there are few data regarding the occurrence of liquids on the eastern end of the landfill.

Contaminant Fate and Transport. Conclusions regarding contaminant transport from the landfill into and through groundwater in the Eastern Area are summarized below.

- Coarse-grained aquifer materials in the Unconfined Aquifer System appear to be in contact with the base of the landfill along the eastern end. The most likely contaminant pathways in the Eastern Area are through these coarse-grained, permeable units of the unconfined aquifer that are contacting the waste prism.

- The majority of the contamination emanating from the eastern portion of the South Parcel will migrate into the Unconfined Aquifer System; lesser amounts and concentrations will be transported in the deeper units.

4.4.4 West and South Aquifer Systems—Groundwater Contamination

The South Aquifer trends approximately northeast-southwest in a narrow elongated band along the southern boundary of the landfill, and does not appear to be laterally extensive in the northwest-southeast direction. EPA has detected the West Aquifer only along the western boundary of the South Parcel; it does not appear to be laterally extensive to the west.

Nature and Extent of Contamination. Based on maximum contaminant level exceedances, it appears that fairly isolated, low-level areas of contamination are present in the South and West Aquifers (Figure 8).

In the West Aquifer, organic contamination has been increasing in Well OI-18B and exceeds maximum contaminant levels for three constituents. The extent of the West Aquifer downgradient of the landfill perimeter is not well defined. The source of the West Aquifer contamination could be either direct communication with the landfill beneath the central portion of the South Parcel or vertical transport through the Shallow Silt Flow System.

In the South Aquifer, three wells show maximum contaminant level exceedances (Wells OI-06, OI-29B and OI-15B) (Figure 8). In the South Aquifer, the source could either be contaminants migrating through the vadose zone in the unconfined portions of the unit (at the eastern end of the landfill and in the vicinity of Well OI-6), through vertical migration of contamination through the Shallow Silt Flow System, or through hydraulic connection with the base of the landfill itself (towards the eastern end).

Contaminant Fate and Transport. Groundwater in the South and West Aquifers ultimately flows toward the Central Basin (EPA, 1994c). The Pico Unit South Aquifer System is likely below the Central Basin's Sunnyside Aquifer (the deepest San Pedro Formation drinking water source in the Central Basin) and may represent the lowest fresh-water-bearing unit in the Central Basin. The Pico Unit South Aquifer could potentially be used in the future as a drinking water source, although it is not currently used as such. If the West Aquifer System were continuous across the entire area south and west of the landfill, it appears that it would correspond to an upper portion of the Sunnyside Aquifer. However, the limited available data indicate that the West Aquifer is continuous throughout this area.

5.0 Summary of Site Risks

EPA performed a Baseline Ecological Risk Assessment and a Baseline Human Health Risk Assessment to evaluate whether there are unacceptable human health or ecological risks from potential exposure to chemicals associated with the OII Site. This section summarizes the key components and findings of the Baseline Risk Assessments. The Baseline Risk Assessments are included as Appendixes A (ecological) and B (human health) in the Feasibility Study Report (EPA, 1996). The primary objectives of the risk assessment were:

- To identify the primary causes and relative magnitude of risks to human health or the environment associated with existing or potential contaminant exposure
- To evaluate whether remedial actions are needed to protect human health or the environment
- To support development of the Feasibility Study through preparation of preliminary cleanup goals and providing risk estimates for decisionmaking processes in selecting a remedial alternative

5.1 Baseline Human Health Risk Assessment Summary

In accordance with the streamlined approach for Baseline Risk Assessments at CERCLA municipal landfills, EPA focused the Baseline Risk Assessment for the OII Site on those media beyond the source area: ambient air, groundwater, and offsite soils/sediment. EPA intended the Baseline Risk Assessment to identify those contaminants and media requiring remedial action based on unacceptable risks. The media, pathways, and chemicals addressed under the streamlined approach are discussed briefly below.

Modified No-Action Scenario. For the OII Site, under the modified no-action scenario, rather than a typical no-action scenario, EPA evaluated risks of exposure assuming that currently existing and operating control systems remain in place; and that no additional remedial actions would be constructed or operated. The modified no-action scenario was selected as the basis for the Risk Assessment because the data collected during the remedial investigation were collected while existing systems were operating. Thus, current site conditions (baseline) are best represented by the modified scenario.

5.1.1 Identification of Contaminants of Potential Concern

EPA selected chemicals of potential concern from validated environmental monitoring data collected between 1989 and 1990 for ambient air, 1989 and 1993 for groundwater, and 1987 and 1992 for North Parcel and near-site soil, respectively. For purposes of the Baseline Risk Assessment, these data were assumed to represent current conditions and to reflect an adequate time period to incorporate seasonal or annual variations. Table 3 lists the chemicals of potential concern used in the baseline risk assessment.

5.1.2 Exposure Assessment

This section briefly summarizes the potentially exposed populations, the exposure pathways, and the exposure quantification from the Baseline Human Health Risk Assessment.

5.1.2.1 Potentially Exposed Populations

Potential receptors on the landfill property include authorized workers within the fenced area (the South Parcel and the landfilled portion of the North Parcel) and employees and customers of the commercial operations on the remainder of the North Parcel. Potential receptors in the area surrounding the landfill include workers in the surrounding industrial and commercial facilities and children and adults in the residential areas.

5.1.2.2 Chemical Exposure Pathways

An exposure pathway describes how a receptor could be exposed to contaminants present at a site or released from a site. A complete exposure pathway requires the following elements: a source, a mechanism for release and migration, an exposure medium, a point of potential human contact, and a route of exposure.

Under the streamlined approach, only those exposure scenarios associated with contaminated media beyond the source area (waste prism and its components) were quantitatively evaluated in the Baseline Risk Assessment. The retained exposure pathways include: (1) inhalation of contaminants in ambient air by residents; (2) potential ingestion, dermal contact with, and inhalation of contaminated groundwater by adult residents; and (3) ingestion, dermal contact

Table 3
Selected Chemicals of Potential Concern for Air, Groundwater, and Soil
OII Site Final Record of Decision

Chemical Name	Air	Groundwater	Soil
Organic Constituents			
1,1,1,2-Tetrachloroethane		x	
1,1,1-Trichloroethane	x	x	
1,1,2-Trichloroethane		x	
1,1-Dichloroethane	x	x	x
1,1-Dichloroethylene		x	
1,2,4-Trichlorobenzene		x	
1,2-Dibromoethane			
1,2-Dichlorobenzene		x	
1,2-Dichloroethane	x	x	x
1,2-Dichloroethylene (Total)		x	x
1,2-Dichloroethylene, trans-		x	
1,2-Dichloropropane		x	
1,3-Dichlorobenzene		x	x
1,3-Dichloropropene, trans-		x	
1,4-Chlorotoluene		x	
1,4-Dichlorobenzene		x	
1,4-Dioxane		x	
2,4-Dimethylphenol		x	
2-Butanone		x	x
2-Hexanone		x	
2-Methylnaphthalene		x	x
2-Methylphenol		x	
3,3'-Dichlorobenzidine			x
4,4'-DDD		x	
4,4'-DDE		x	
4,4'-DDT		x	
4-Methyl-2-pentanone		x	x
4-Methylphenol		x	x
4-Nitroaniline			x
Acenaphthene		x	x
Acetone		x	x
Aldrin		x	
Anthracene		x	x
Benzene	x	x	x
Benzo(a)anthracene			x
Benzo(a)pyrene			x
Benzo(b)fluoranthene			x
Benzo(g,h,i)perylene			x
Benzo(k)fluoranthene			x
Benzoic acid		x	x
Benzyl alcohol		x	
Benzyl chloride		x	
Beta-BHC		x	
BHC, alpha-		x	
BHC, delta-		x	
BHC, gamma- (Lindane)		x	
bis(2-Ethylhexyl)phthalate		x	x
Butylbenzylphthalate		x	x
Carbazole		x	
Carbon disulfide		x	x
Carbon tetrachloride	x	x	
Chlordane		x	
Chlordane, gamma-		x	

Table 3
Selected Chemicals of Potential Concern for Air, Groundwater, and Soil
Oil Site Final Record of Decision

Chemical Name	Air	Groundwater	Soil
Chlorobenzene	x	x	x
Chloroethane		x	
Chloroform	x	x	
Chloromethane		x	
Chrysene			x
cis-1,2-Dichloroethylene		x	x
cis-1,3-Dichloropropene		x	
Di-n-butylphthalate		x	x
Di-n-octylphthalate		x	x
Dibenzofuran		x	x
Dibromochloromethane		x	
Dichlorodifluoromethane		x	
Dieldrin		x	
Diethylphthalate		x	
Dimethylphthalate		x	
Endosulfan I		x	
Endosulfan II		x	
Endosulfan sulfate		x	
Endrin		x	
Endrin aldehyde		x	
Ethylbenzene	x	x	x
Fluoranthene		x	x
Fluorene		x	
Heptachlor		x	
Heptachlor epoxide		x	
Hexachlorobutadiene			x
Isophorone		x	
Methoxychlor		x	
Methylene chloride		x	x
N-Nitrosodiphenylamine		x	x
Naphthalene		x	x
Pentachlorophenol			x
Phenanthrene		x	x
Phenol		x	x
Purgeable organic halogens		b	
Pyrene		x	x
Styrene		x	x
Tetrachloroethylene	x	x	
Toluene	x	x	x
Total Organic halogens		b	
Trichloroethylene	x	x	x
Trichlorofluoromethane (Freon 11)		x	
Vinyl actetate			x
Vinyl chloride	x	x	x
Xylene, m,p,-		x	x
Xylene, m-		x	
Xylene, o-		x	
Xylenes, p-		x	
Xylenes, total-		x	x

Table 3
Selected Chemicals of Potential Concern for Air, Groundwater, and Soil
OII Site Final Record of Decision

Chemical Name	Air	Groundwater	Soil
Inorganic Constituents			
Aluminum		x	x
Ammonia nitrogen (as N)		x	
Antimony		x	x
Arsenic		x	x
Barium		x	x
Beryllium		x	x
Cadmium		x	x
Calcium		a	a
Chloride		b	
Chromium (Total)		x	x
Cobalt		x	x
Copper		x	x
Cyanide		x	x
Iron		a	a
Lead		x	x
Magnesium		a	a
Manganese		x	x
Mercury		x	x
Nickel		x	x
Nitrate		x	
Nitrite (as N)		x	
Potassium		a	a
Selenium		x	x
Silver		x	x
Sodium		a	a
Sulfate		b	
Sulfide		b	
Thallium		x	x
Tin			x
Vanadium		x	x
Zinc		x	x

Key:
a: Essential Nutrients
b: Major cation/anion, or other water quality parameter
x: Chemical of Potential Concern

with, and inhalation of contaminated soil/sediments by workers (North Parcel soil only) and residents. Ambient air and soil/ sediment exposure pathways are currently complete exposure pathways; the groundwater exposure pathway is not currently complete because nearby groundwater is not being used, but could be at some point in the future.

EPA estimated ambient air and soil/sediment exposures for adult and child residents. EPA also evaluated soil from the North Parcel for worker exposure and groundwater for adult residential exposure.

5.1.2.3 Exposure Quantification

Exposure, defined as contact with a chemical or physical agent, is estimated using six factors: chemical concentration at the point of exposure, contact rate, exposure frequency, exposure duration, body weight, and averaging time, as described by the following general equation:

$$\text{Intake} = \frac{\text{Concentration x Contact Rate x Exposure Frequency x Exposure Duration}}{\text{Body Weight x Averaging Time}}$$

Exposure, or intake, is expressed as milligrams of chemical per kilogram of body weight per day (mg/kg-day) to normalize for time and body weight. The following presents the parameters and methods used in estimating exposure for each of the selected exposure pathways.

Ambient Air. EPA used air concentrations from the 24-hour ambient air study to calculate chemical intake by inhalation (mg/kg-day) for residential exposures to adults and children. Key exposure parameters are shown in Table 4.

Groundwater. Residents could be exposed to contaminants in groundwater through ingestion, inhalation of volatile organic compounds, or dermal contact with groundwater if used for a water supply.

Ingestion. The parameters used to calculate the intake associated with the ingestion of contaminants in groundwater are shown in Table 5.

Inhalation. Residents could also be exposed to chemicals transferred from tap water to the air from showers, baths, toilets, dishwashers, washing machines, and during cooking. Inhalation of chemicals from groundwater is applicable only for volatile compounds. EPA evaluated risks due to inhalation of volatile organic compounds from groundwater according to the approach that Andelman et al. developed (Andelman et al., 1987). EPA selected the highest volatilization factor of 0.0005 from the Andelman et al. approach. Using the EPA volatilization factor of 0.0005 to convert groundwater concentrations to a corresponding air concentration, EPA calculated the intake associated with the inhalation of chemicals volatilized from groundwater using the parameters presented in Table 6.

Table 4 Exposure Parameters for Estimating Exposure for Residential Intake of Ambient Air OII Site Final Record of Decision			
	Reasonable Maximum		Average Value
Description (units)	**Child**	**Adult[a]**	**Adult[a]**
Exposure point concentration for air (mg/m^3)	95% UCL	95% UCL	95% UCL
Body weight (kg)	18[b]	70	70
Inhalation rate (m^3/day)	10[c]	20	20
Exposure frequency (days/year)	350	350	350
Exposure duration (years)	9	30	9
Averaging Time (years) - Cancer	70	70	70
Averaging Time (years) - Noncancer	9	30	9

[a]EPA, 1991f, unless otherwise noted.
[b]EPA, 1989h.
[c]EPA, 1994d.

Table 5 Parameters for Estimating Residential Exposures from Ingestion of Groundwater Contaminants OII Site Final Record of Decision		
Description (units)	**Value[a]**	**Average Value[b]**
Exposure point concentration for groundwater (mg/L)	Arithmetic mean	Arithmetic mean
Daily water ingestion rate (L/day)	2	1.4
Exposure frequency (days/year)	350	350
Exposure duration (years)	30	9
Body weight (kg)	70	70
Averaging Time (years) - Cancer	70	70
Averaging Time (years) - Noncancer	30	9

[a]EPA, 1991e.
[b]EPA, 1992f.

Table 6 **Parameters for Estimating Chemical Intake for an Adult Resident from Inhalation of Groundwater Volatiles** **OII Site Final Record of Decision**		
Description (units)	**Reasonable Maximum Exposure Value[a]**	**Average Value[b]**
Exposure point concentration in air (mg/m^3)	C_wx0.5	C_wx0.5
Exposure point concentration in water (mg/L)	Arithmetic mean	Arithmetic mean
Body weight (kg)	70	70
Averaging Time (years) - Cancer Averaging Time (years) - Noncancer	70 30	70 9
Exposure frequency (days/year)	350	350
Exposure duration (years)	30	9
Daily inhalation rate (m^3/day)	15	15

[a]EPA, 1991e.
[b]EPA, 1992f.

Table 7 **Parameters for Estimating Chemical Absorption from Dermal Contact with Groundwater** **OII Site Final Record of Decision**		
Description (units)	**Reasonable Maximum Exposure Value[a]**	**Average Value[b]**
Exposure point concentration in water (mg/L)	Arithmetic mean	Arithmetic mean
Exposed skin surface area (cm^2/event)	23,000	20,000
Dermal permeability coefficient (cm/hour)	Chemical-Specific[c]	Chemical-Specific[c]
Exposure time (hour/day)	0.25	0.17
Exposure frequency (event/year)	350	350
Exposure duration (years)	30	9
Body weight (kg)	70	70
Averaging time (years) Cancer effects Noncancer effects	 70 30	 70 9

[a]Cal-EPA, 1992.
[b]EPA, 1992g.
[c]EPA, 1992j.

Dermal Contact. Dermal absorption is typically an insignificant route of exposure in the residential groundwater use setting. However, EPA estimates dermal absorption for chemical contaminants to assure that any potential risks from this exposure pathway are addressed. The magnitude of potential exposure by this pathway is related to the concentration in water, surface area of exposed skin, the dermal penetrability of the contaminant, and frequency and duration of exposure. The parameters in Table 7 were used to estimate exposure through dermal contact.

Soils/Sediments

Ingestion. Exposure through ingestion of contaminants in soil/sediments depends on the concentration in soil, the amount ingested, and the frequency and duration of exposure.

EPA evaluated average and reasonable maximum exposures for both a toddler (0-6 years) and an adult, using the parameters presented in Table 8.

Inhalation. EPA calculated exposure via inhalation of dust and vapors from contaminated surface soil using soil concentration, the soil volatilization factor, the particulate emission factor describing the amount of soil entrained in the air as dust, inhalation rate, and the frequency and duration of exposure. The particulate emission factor expresses the relationship of chemical concentrations adsorbed to soil and concentrations of airborne respirable dust particles and is estimated using EPA default values (EPA, 1991e). The parameters used to estimate intake from inhaling both contaminated dust from soil and volatile compounds from soil are presented in Table 8.

Dermal Contact. Dermal absorption of contaminants in soil/sediments is a function of the concentration in soil, the surface area of exposed skin, the ability of the contaminant to penetrate through the skin, and frequency and duration of exposure.

EPA estimated the absorbed dose from reasonable maximum and average exposure by dermal contact with contaminants in soil using the parameters presented in Table 8. Toddler (0 to 6 years) and adult exposures were calculated for reasonable maximum and average exposure.

5.1.3 Toxicity Assessment

Chemical contaminants may be divided into two groups according to their effects on human health. Contaminants may have carcinogenic effects or noncarcinogenic/systemic effects. Exposure to some of the chemicals detected at the OII Site could potentially result in both types of effects. Carcinogenic effects result in, or are suspected to result in, the development of cancer.

Table 8
Parameters for Estimating Intake for Residents and Workers Via Dermal, Inhalation, and Ingestion Exposure to Soil
OII Site Final Record of Decision

Description	Residents		Workers	
	RME Value[a]	Average Value[b]	RME Value[a]	Average Value[b]
Exposure Point Concentration in Soil	Lessor of the maximum or 95% UCL values	Arithmetic mean	Lesser of the maximum or 95% UCL values	Arithmetic mean
Body Weight (kg):				
Toddler (0-6 years)	15	15	-	-
Adult	70	70	70	70
Soil Ingestion Rate (mg/day)				
Toddler (0-6 years)	200	200	-	-
Adult	100	100	50	50
Inhalation Rate (m^3/day)				
Toddler (0-6 years)	16	16	-	-
Adult	20	20	20	20
Soil-Volatilization Factor (m^3/kg)	Chemical-specific[c]	Chemical-specific[c]	Chemical-specific[c]	Chemical-specific[c]
Particulate Emission Factor (m^3/kg)	4.63×10^9	4.63×10^9	4.63×10^9	4.63×10^9
Skin Surface Area (cm^2)				
Toddler	2,400[d]	2,100[d]	-	-
Adult	5,800[d]	5,000[d]	5,800[d]	5,000[d]
Absorption Factor (fraction)	0.10 (organics)[e] 0.01 (inorganics)	0.10 (organics)[e] 0.01 (inorganics)	0.10 (organics)[e] 0.01 (inorganics)	0.10 organics)[e] 0.01 (inorganics)
Soil-to-Skin Adherence Factor (mg/cm^2)	0.2[d]	0.2[d]	0.2[d]	0.2[d]
Exposure Frequency (days/year)	350	350	250	250
Exposure Duration (years)				
Cancer (adult)	30	9	25	9
Noncancer (adult)	30	9	25	9
Child	6	6	-	-
Averaging Time				
Cancer (adult)	70	70	70	70
Noncancer (adult)	30	9	25	9
Cancer (child)	70	70	-	-
Noncancer (child)	6	6	-	-

[a]EPA, 1991e, unless otherwise noted.
[b]EPA, 1992g, unless otherwise noted.
[c]Inhalation of volatilized chemicals for all COPC with a Henry's Law Constant (HLC) greater than or equal to 1×10^{-5} atm-m^{-3}/mole and a molecular weight (MW) less than or equal to 200 g/mole.
[d]EPA, 1992.
[e]SCAQMD, 1988.

EPA has developed a carcinogen classification system using weight-of-evidence to classify the likelihood that a chemical is a human carcinogen. Definitions for the weight-of-evidence classifications are presented below.

EPA Weight-of-Evidence Classification System for Carcinogenicity	
Group	**Description**
A	Human carcinogen, based on evidence from epidemiological studies.
B1 or B2	Probable human carcinogen. B1 indicates that limited human data are available. B2 indicates sufficient evidence in animals and inadequate or no evidence in humans.
C	Possible human carcinogen, based on limited evidence in animals.
D	Not classifiable as to human carcinogenicity.
E	Evidence of noncarcinogenicity for humans.
Source: EPA, 1986b.	

Noncarcinogenic or systemic effects include a variety of toxicological end points and may include effects on specific organs or systems, such as the kidney, liver, and lungs.

EPA's Carcinogenic Assessment Group has developed cancer slope factors for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals of potential concern. Cancer slope factor(s), which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the cancer slope factor(s). Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer slope factor(s) are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (for example, to account for the use of animal data to predict effects on humans).

EPA has developed reference doses to indicate the potential for adverse health effects from exposure to chemicals of potential concern exhibiting noncarcinogenic effects. Reference doses, which are expressed in units of mg/kg-day, are estimated threshold levels for daily exposure above which exposure is considered unsafe for humans, including sensitive individuals. Estimated intakes of chemicals of potential concern from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the reference doses. Reference doses are derived from the results of human epidemiological studies or animal studies to which uncertainty factors have been applied (for example, to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the reference doses will not underestimate the potential for adverse noncarcinogenic effects to occur.

Table 9 presents toxicity values for chemicals of potential concern for both carcinogenic and noncarcinogenic effects. Slope factors and reference doses are specific to the route of exposure. For example, oral slope factors are used to evaluate risk through ingestion of carcinogenic chemicals of potential concern. In cases where route-specific cancer slope factors or reference doses were not available (for example, for the inhalation and dermal routes), oral cancer slope factors or reference doses were used.

5.1.4 Risk Characterization Summary

Information presented in the exposure assessment and the toxicity assessment is integrated in this section to characterize risk to human health from chemicals of potential concern at the OII Site.

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6} or 1E-6). An excess lifetime cancer of 1×10^{-6} indicates that as a reasonable maximum estimate, an individual has a one in one million chance of developing cancer as result of site-related exposure to a carcinogen over a 70-year lifetime under specific exposure conditions at the OII Site; similarly, an excess lifetime cancer risk of 1×10^{-4} refers to a reasonable maximum estimate of a one in ten thousand chance of developing cancer as a result of the exposure.

EPA uses the general 10^{-4} to 10^{-6} risk range as a "target range" within which EPA strives to manage risks as part of a Superfund cleanup. Although the EPA risk manager may deem acceptable the waste management strategies achieving reductions in site risks anywhere within the risk range, EPA has expressed a preference for cleanups achieving the more protective end of the range (for example, 10^{-6}).

The potential for noncarcinogenic health effects is evaluated by comparing an exposure level over a specified time period (for example, a lifetime) with a reference doses derived for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient. If the estimated intake (exposure) is greater than the reference doses, the hazard quotient will be greater than one. A hazard quotient greater than one indicates the potential for an adverse noncarcinogenic health effect from exposure to the chemical.

A hazard index is generated by adding the hazard quotients for all chemicals of potential concern within a medium or across all media to which a given population may reasonably be exposed. A hazard index exceeding one indicates the potential for an adverse

Table 9
Toxicity Values and Chemical-Specific Parameters
for Chemicals of Potential Concern
OII Site Final Record of Decision

Chemical Name	Oral RfD[a] mg/kg-day	Inhalation RfD[a] mg/kg-day	Weight-of-Evidence Classification	Oral Slope Factor kg-day/mg	Inhalation Slope Factor kg-day/mg	Kp[b] cm/hr	ABS[c]	VF[d]
Organic Compounds								
acenaphthene	0.06	0.06	NA	--	--	0.15	0.1	2.11E+05
acetone	0.1	0.1	D	--	--	0.0012	0.1	2.70E+04
aldrin	0.00003	0.00003	B2	17	17.15	0.0016	0.1	--
anthracene	0.3	0.3	D	--	--	0.2258	0.1	2.18E+06
benzene	--	--	A	0.029	0.02905	0.11	0.1	9.60E+03
benzo(a)anthracene	--	--	B2	0.73	0.73	0.81	0	--
benzo(a)pyrene	--	--	B2	7.3	--	1.2	0.1	
benzo(b)fluoranthene	--	--	B2	0.73	0.73	--	0.1	--
benzo(g,h,i)perylene	--	--	D	--	--	0.107	0.1	--
benzo(k)fluoranthene	--	--	B2	0.073	0.073	0.033	0.1	--
benzoic acid	4	4	D	--	--	0.0073	0.1	--
benzyl alcohol	0.3	0.3	NA	--	--	0.0025	0.1	--
benzyl chloride	--	--	B2	0.17	0.17	0.0138	0.1	1.00E+05
bis(2-ethylhexyl)phthalate	0.02	0.02	B2	0.014	0.014	0.033	0.1	--
butanone, 2-	0.6	0.2857	D	--	--	0.005	0.1	3.68E+04
butylbenzyl phthalate, n-	0.2	0.2	C	--	--	0.073	0.1	--
carbazole	--	--	B2	0.02	0.02	0.07967	0.1	--
carbon disulfide	0.1	0.002857	NA	--	--	0.5	0.1	5.10E+03
carbon tetrachloride	0.0007	0.00057	B2	0.13	0.0525	0.022	0.1	6.10E+03
chlordane	0.00006	--	B2	1.3	1.3	0.046	0.1	--
chlorobenzene	0.02	0.005714	D	--	--	0.041	0.1	2.90E+04
chloroethane	--	2.857	NA	--	--	0.008	0.1	2.70E+03
chloroform	0.01	0.01	B2	0.0061	0.0805	0.13	0.1	9.10E+03
chloromethane	0.0036	--	C	0.013	0.0063	0.0042	0.1	2.80E+03
chlorotoluene, p-	0.02	--	D	--	--		0.1	2.10E+04
chrysene	--	--	B2	0.0073	0.0073	0.81	0.1	5.53E+07
ddd, 4,4'-	--	--	B2	0.24	0.24	0.28	0.1	--
dde, 4,4'-	--	--	B2	0.34	0.34	0.24	0.1	--
ddt, 4,4'-	0.0005	0.0005	B2	0.34	0.3395	0.43	0.1	--
di-n-butyl-phthalate	0.1	0.1	D	--	--	0.033	0.1	--
di-n-octyl-phthalate	0.02	0.02	NA	--	--	26.88	0.1	--
dibenzofuran	0.004	--	D	--	--	0.107	0.1	--
dibromochloromethane	0.02	0.02	C	0.084	0.084	0.0039	0.1	--
dibromoethane, 1,2-	--	0.00005714	B2	85	0.77		0.1	2.90E+04
dichlorobenzene, 1,2-	0.09	0.05714	D	--	--	0.061	0.1	5.70E+04
dichlorobenzene, 1,3-	0.089	--	D	--	--	0.087	0.1	5.70E+04
dichlorobenzene, 1,4-	0.22856	0.22856	B2	0.024	0.024	0.062	0.1	6.30E+04
dichlorobenzidine, 3,3-	--	--	B2	0.45	0.45	0.017	0.1	--
dichlorodifluoromethane	0.2	0.05714	D	--	--	0.012	0.1	1.80E+03
dichloroethane, 1,1-	0.1	0.14285	C	--	--	0.0089	0.1	6.20E+03
dichloroethane, 1,2-	--	--	B2	0.091	0.091	0.0053	0.1	9.30E+03
dichloroethene, 1,1-	0.009	0.009	C	0.6	0.175	0.016	0	1.50E+03
isomers)	0.009	0.009	NA	--	--	0.001	0.1	8.80E+03
dichloroethene, cis-1,2-	0.01	0.01	D	--	--	0.001	0.1	5.90E+03

Table 9
Toxicity Values and Chemical-Specific Parameters
for Chemicals of Potential Concern
OII Site Final Record of Decision

Chemical Name	Oral RfD[a] mg/kg-day	Inhalation RfD[a] mg/kg-day	Weight-of-Evidence Classification	Oral Slope Factor kg-day/mg	Inhalation Slope Factor kg-day/mg	Kp[b] cm/hr	ABS[c]	VF[d]
dichloroethene, trans-1,2-	0.02	0.02	D	--	--	0.01	0	8.70E+03
dichloropropane, 1,2-	0.0011	0.0011428	B2	0.068	0.068	0.01	0.1	1.10E+04
dichloropropene, 1,3-	0.0003	0.005714	B2	0.18	0.1295	0.0055	0.1	1.80E+04
dieldrin	0.00005	0.00005	B2	16	16.1	0.016	0.1	--
diethylphthalate	0.8	0.8	D	--	--	0.0048	0.1	--
dimethylphenol, 2,4-	0.02	0.02	NA	--	--	0.0015	0.1	--
dimethylphthalate	10	10	D	--	--	0.0016	0	--
dioxane, 1,4-	--	--	B2	0.011	0.011	0.0004	0.1	5.20E+04
endosulfan	0.00005	0.00005	NA	--	--	0.002	0.1	--
endrin	0.0003	0.0003	D	--	--	0.003	0.1	--
ethylbenzene	0.1	0.2857	D	--	--	1	0.1	1.60E+04
fluoranthene	0.04	0.04	D	--	--	0.36	0.1	--
fluorene	0.04	0.04	D	--	--	0.358	0.1	1.12E+06
heptachlor	0.0005	0.0005	B2	4.5	4.55	0.011	0.1	--
heptachlor epoxide	0.000013	0.000013	B2	9.1	9.1	0.055	0.1	--
hexachlorobutadiene	0.002	0.002	C	0.078	0.077	0.12	0.1	--
hexachlorocyclohexane, alpha-	--	--	B2	6.3	6.3	0.019	0.1	--
hexachlorocyclohexane, beta-	--	--	C	1.8	1.855	0.016	0.1	--
hexachlorocyclohexane, delta-	--	--	D	--	--	0.028	0.1	--
hexachlorocyclohexane, gamma-	0.0003	0.0003	B2 - C	1.3	1.3	0.014	0.1	--
hexanone, 2-	--	--	NA	--	--	0.005	0.1	--
indeno(1,2,3-cd)pyrene	--	--	B2	0.73	0.73	1.9	0.1	--
isophorone	0.2	0.2	C	0.0010	0.0010	0.0042	0.1	--
methoxychlor	0.005	0.005	D	--	--	0.04328	0.1	--
methyl-2-pentanone, 4-	0.05	0.022856	NA	--	--	0.0015	0.1	6.40E+04
methylene chloride	0.06	0.8571	B2	0.0075	0.0016	0.0045	0.1	4.77E+03
methylphenol, 2-	0.05	0.05	C	--	--	0.016	0.1	--
methylphenol, 4-	0.005	0.005	C	--	--	0.01	0.1	--
naphthalene	0.04	0.04	D	--	--	0.069	0.1	1.05E+05
nitroaniline, p-	-	-	NA	--	-	0.014	0.1	--
nitrosodiphenylamine, n-	--	--	B2	0.0049	0.0049	0.0079	0.1	4.31E+03
pentachlorophenol	0.03	--	B2	0.12	0.12	0.65	0.1	--
phenanthrene	--	--	D	--	--	0.23	0.1	2.11E+06
phenol	0.6	0.6	D	--	--	0.0082	0.1	--
pyrene	0.03	0.03	D	--	--	0.3255	0.1	--
styrene	0.2	0.2	C			0.67	0.1	4.03E+04
tetrachloroethane, 1,1,1,2-	0.03	--	C	0.0260	0.0259	0.0256	0.1	3.79E+04
tetrachloroethene	0.01	0.01	C-B2	0.052	0.002	0.37	0.1	1.71E+04
toluene	0.2	0.11428	D	--	--	1	0.1	1.91E+04
trichlorobenzene, 1,2,4-	0.01	0.0025713	D	--	--	0.1	0.1	2.18E+05
trichloroethane, 1,1,1-	0.09	0.2857	D	--	--	0.017	0.1	2.25E+04
trichloroethane, 1,1,2-	0.004	0.004	C	0.0570	0.0560	0.0084	0.1	2.11E+04
trichloroethene	0.006	0.006	B2	0.0110	0.0060	0.2300	0.1	1.12E+04
trichlorofluoromethane	0.3	0.19999	D	--	--	0.017	0.1	3.44E+03
vanadium	0.007	--	NA	--	--	0.001	0	--

Table 9
Toxicity Values and Chemical-Specific Parameters
for Chemicals of Potential Concern
OII Site Final Record of Decision

Chemical Name	Oral RfD[a] mg/kg-day	Inhalation RfD[a] mg/kg-day	Weight-of-Evidence Classification	Oral Slope Factor kg-day/mg	Inhalation Slope Factor kg-day/mg	Kp[b] cm/hr	ABS[c]	VF[d]
vinyl acetate	1	0.05714	NA	--	--		0.1	--
vinyl chloride	--	--	A	1.9	0.294	0.0073	0.1	3.46E+03
xylene, m-	2	0.2	NA	--	--	0.08	0.1	6.07E+04
xylene, mixture	2	0.2	D	--	--	0.08	0.1	6.89E+04
xylene, o-	2	0.2	NA	--	--	0.08	0.1	8.55E+04
xylene, p-	2	0.2	NA	--	--	0.08	0.1	5.99E+04
Inorganic Compounds								
aluminum	1	--	NA	--	--	0.001	0	--
ammonia	0.97	0.02857	D	--	--	0.001	0	--
antimony	0.0004	--	D	--	--	0.001	0	--
arsenic	0.0003	--	A	1.75	15.05	0.001	0	--
barium	0.07	0.00014285	D	--	--	0.001	0	--
beryllium	0.005	--	B2	4.3	8.4	0.001	0	--
cadmium (food)	0.001		B1		6.3	0.001	0	--
cadmium (water)	0.0005	--	B1	--	6.3	0.001	0	--
chromium (hexavalent)	0.005	--	A	--	42	0.001	0	--
chromium (trivalent)	1	--	D	--	--	0.001	0	--
iron	--	--	NA	--	--	0.001	0	--
manganese (food)	0.14	0.0000142	D			0.001	0	--
manganese (water)	0.005	0.0000142	D	--	--	0.001	0	--
mercury	0.0003	0.00008571	D	--	--	0.001	0	--
nickel, soluble salts	0.02	--	D	--	--	0.001	0	--
nitrate	1.6	--	D	--	--	0.001	0	--
nitrite	0.1	--	D	--	--	0.001	0.1	--
selenium	0.005	--	D	--	--	0.001	0	--
silver	0.005	--	D	--	--	0.001	0	--
thallium	--	--	D	--	--	0.001	0	--
tin	0.6	--	NA	NA	--	0.001	0	--
zinc	0.3	--	D	--	--	0.001	0	--

a - Reference Dose
b - Dermal Permeability Coefficient
c - Absorption Factor
d - Volatilization Factor

noncarcinogenic health effect from exposure to the medium or media. The hazard index provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

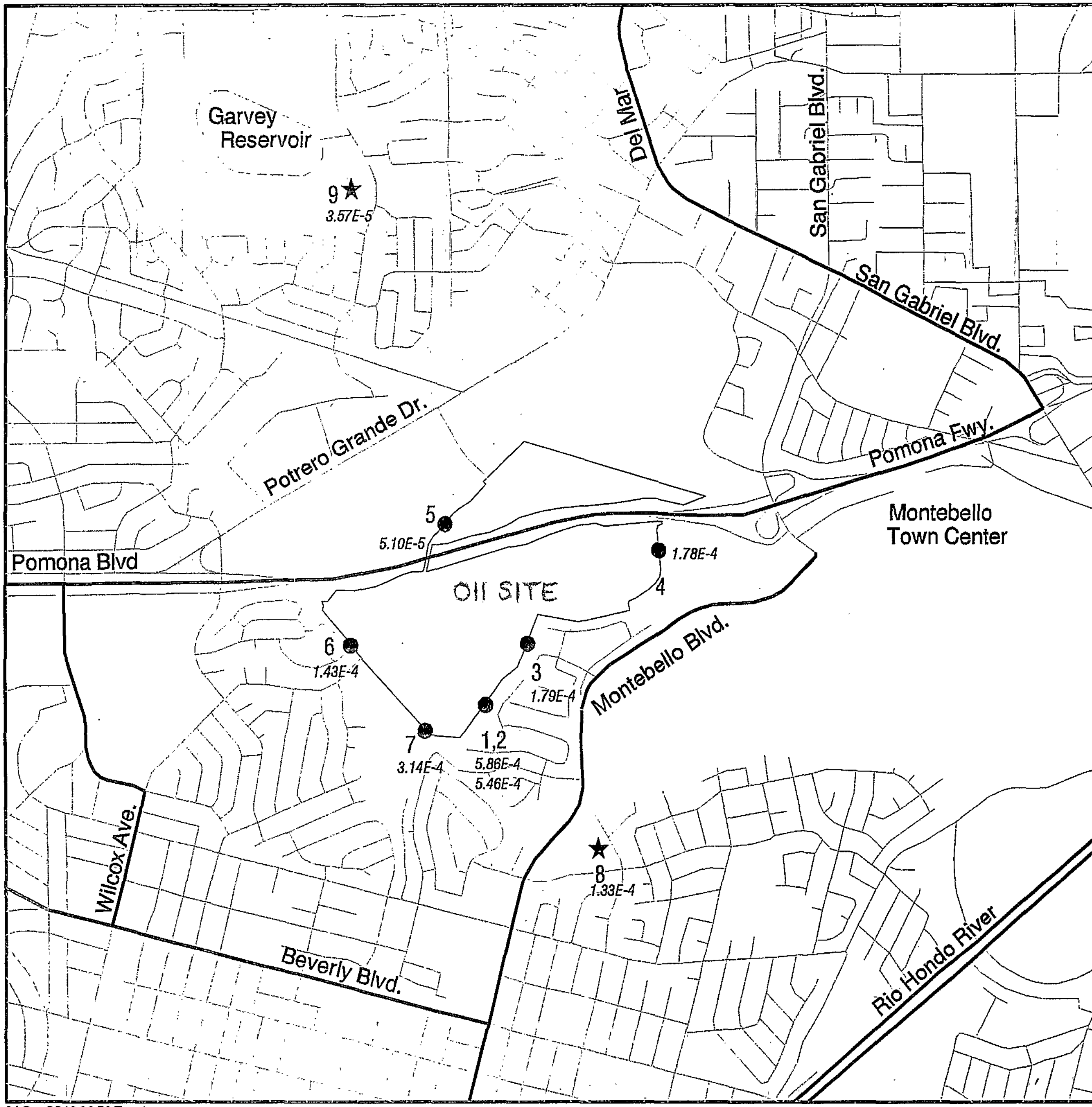
Noncancer hazard indexes and cancer risks were estimated for ambient air, groundwater, and surface soil.

Summary of Estimated Ambient Air Risks. EPA calculated ambient air risk estimates for residential exposure via inhalation. EPA also calculated estimated cancer risks and noncancer hazard indexes for each monitoring station, as shown in Figures 9a and 9b, respectively.

Ambient air was found to present an elevated risk to human health at the monitoring stations around the OII Site. Stations 1, 2, and 7 had the highest cancer risks, exceeding 3×10^{-4}, primarily due to the presence of vinyl chloride, a known landfill contaminant. Other stations had cancer risks falling in the 5.1×10^{-5} to 1.8×10^{-4} range. Excluding the influence of background pollutants, risks at Stations 1, 2, and 7 still exceed 1×10^{-4} under reasonable maximum exposure conditions and Stations 3, 4, and 6 exceed 1×10^{-5}.

Summary of Estimated Soils/Sediment Risks. As recommended for the streamlined approach to conducting remedial investigations at CERCLA municipal landfills, EPA did not sample soils directly overlying the waste prism because these soils will be under the landfill cover after implementation of a final remedy. The cover will prevent future releases of waste and soil from the landfill. EPA used data, from soil samples collected at locations outside the area to be covered, for the Baseline Risk Assessment. EPA collected these samples as part of the near-site surface soil/sediment investigation and the North Parcel investigation soil sampling programs.

EPA evaluated soils and sediments from the North Parcel and near-site sampling areas for child and adult exposure scenarios. Figures 10 and 11 present sample locations and risk assessment results for total cancer risk and total noncancer hazard index, respectively. Under the most health-protective scenario (child reasonable maximum exposure) and the least protective (adult average exposure), all near-site sampled areas but one (Area B under average adult exposure) exceeded a cancer risk of 1×10^{-6}, including the background areas (Pico Background, Lakewood/San Pedro Background, and Freeway Control Area Background). Cancer risks for the Area D, Iguala Park, and Southern California Gas Company sample areas were only slightly greater than background at 1.87×10^{-5} or higher under child reasonable maximum exposure conditions. These compare to background area cancer risks of 1.30×10^{-5} to 1.74×10^{-5} under the same conditions. Noncancer hazard indexes exceeded one for only some areas under the child reasonable maximum exposure scenario (Southern California Gas Facility, Iguala Park, Pico Background, and Area D).



N

0 1000 2000 4000

SCALE IN FEET

Legend:

● 24-Hour Ambient Air Monitoring Station

★ 24-Hour Ambient Air Background Monitoring Station

Total Cancer Risk

RED 1.00E-4 - 1.00E-3

GREEN 1.00E-5 - 1.00E-4

Figure 9A

Total Cancer Risk for Ambient Air Monitoring Station Locations - Residential Adult Reasonable Maximum Exposure Conditions

OII Site Final Record of Decision

24 Sep 96 18:36:59 Tuesday
/GIS4/OII/PLOTS/FIG9A.AML

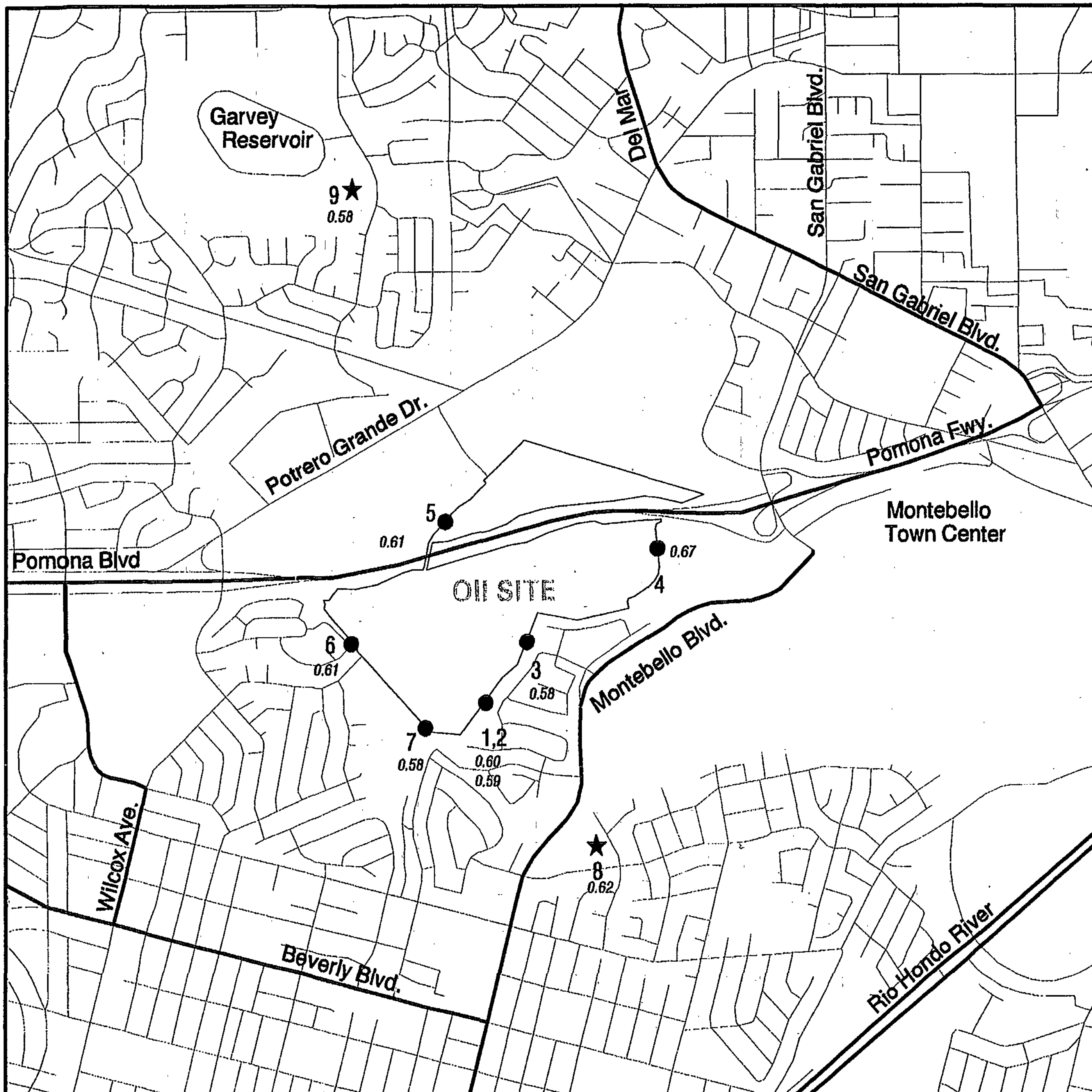


Figure 9B
Total Noncancer Hazard Index for Ambient Air Monitoring Station Locations - Residential Adult Reasonable Maximum Exposure Conditions

OII Site Final Record of Decision

20 Sep 96 11:57:59 Friday
/GIS4/OII/PLOTS/FIG9B.AML

Noncancer hazard indexes for the Southern California Gas Company Facility and Iguala Park, 1.68 and 1.76, respectively, were only slightly greater than Pico Background, 1.34, under child reasonable maximum exposure conditions.

Summary of Estimated Groundwater Risks. Groundwater data are available from monitoring wells installed on or near the landfill. Figures 7 (shallow wells) and 8 (deep wells) show the locations of these groundwater monitoring wells. Groundwater sample results from January 1989 through October 1993 were used to calculate groundwater exposure risks on a well-specific basis. Adult residential receptors were evaluated for potential groundwater exposure via ingestion, volatile inhalation, and dermal contact. Risks were calculated using the reasonable maximum exposure conditions for each of the 72 monitoring wells at the landfill.

For chemicals of concern detected in individual wells, 27 wells exceeded a cancer risk of 1×10^{-4} under reasonable maximum exposure conditions (Figures 12 and 13). Fifty out of 72 wells had associated hazard index values exceeding one (Figures 14 and 15). Twelve wells had hazard index values exceeding 10. The wells with the highest estimated cancer and noncancer risks are generally those wells along the landfill perimeter at the southwest corner of the South Parcel, an area with extensive leachate in the waste prism and numerous exceedances of drinking water standards in the shallow groundwater monitoring wells.

The presence of naturally occurring arsenic, beryllium, and manganese in the OII Site vicinity affects the cancer risk and noncancer hazard index estimates for the groundwater monitoring wells. As discussed in the Feasibility Study Report (EPA, 1996), the estimated cancer risk for arsenic and beryllium is 1.5×10^{-4} using the baseline concentrations presented in the Draft Remedial Investigation Report (EPA, 1994c). Similarly, the hazard quotient for the baseline concentration of manganese is 0.7. Although the estimated "baseline" concentrations are likely somewhat higher than true background, these estimates show how naturally occurring inorganic constituents in the OII Site area complicate the evaluation of site-related risks in groundwater. However, taking these baseline concentrations into consideration, data from 19 wells still indicate site-related risks exceeding 1×10^{-4}.

5.1.5 Baseline Human Health Risk Assessment Conclusion

Actual or threatened releases of hazardous substances from the OII Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

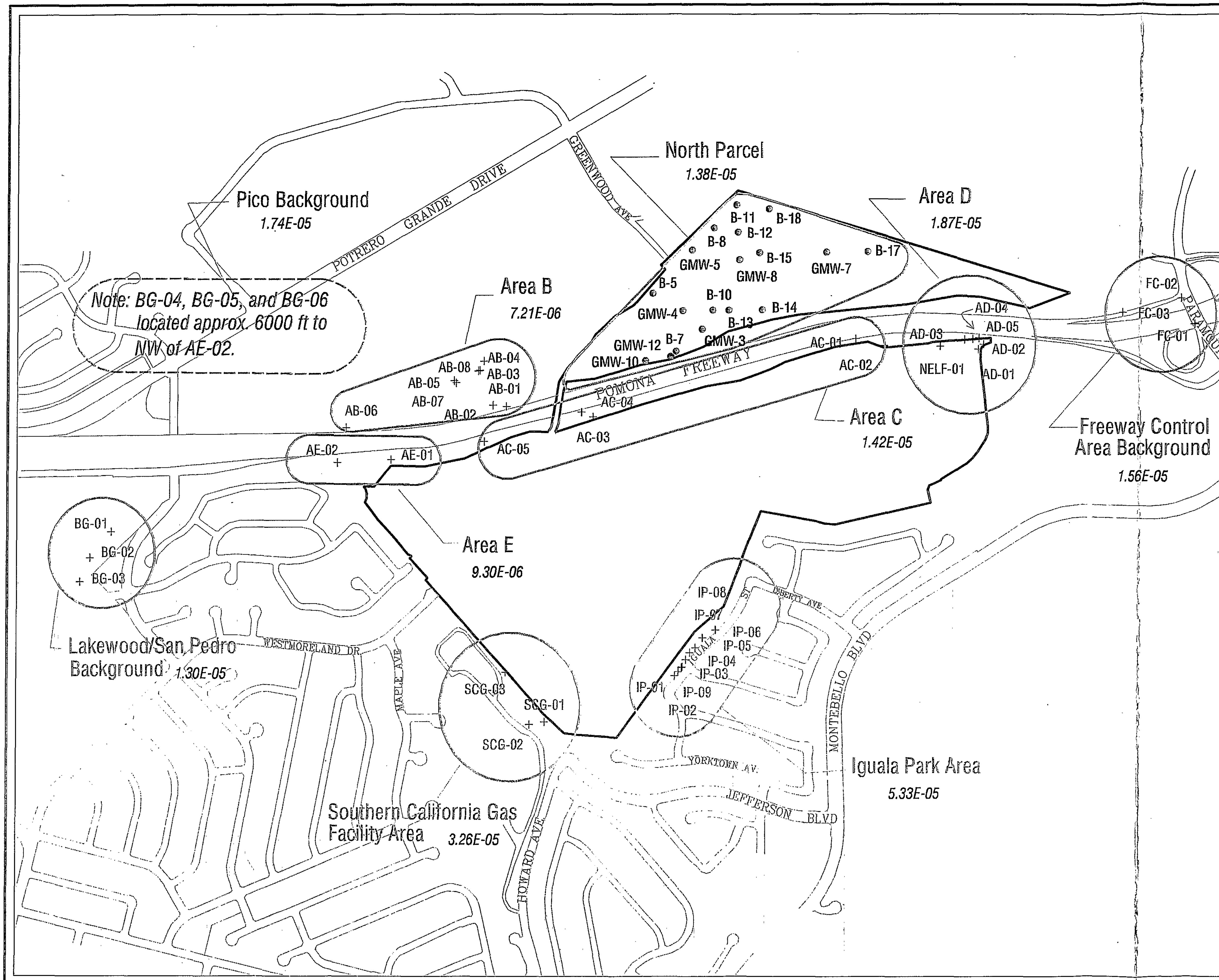


Figure 10
Total Cancer Risk for Surface Soil/Sediment by Area Residential Child Reasonable Maximum Exposure Conditions

20 Sep 96 12:00:36 Friday
/GIS4/OII/PLOTS/FIG10.AML

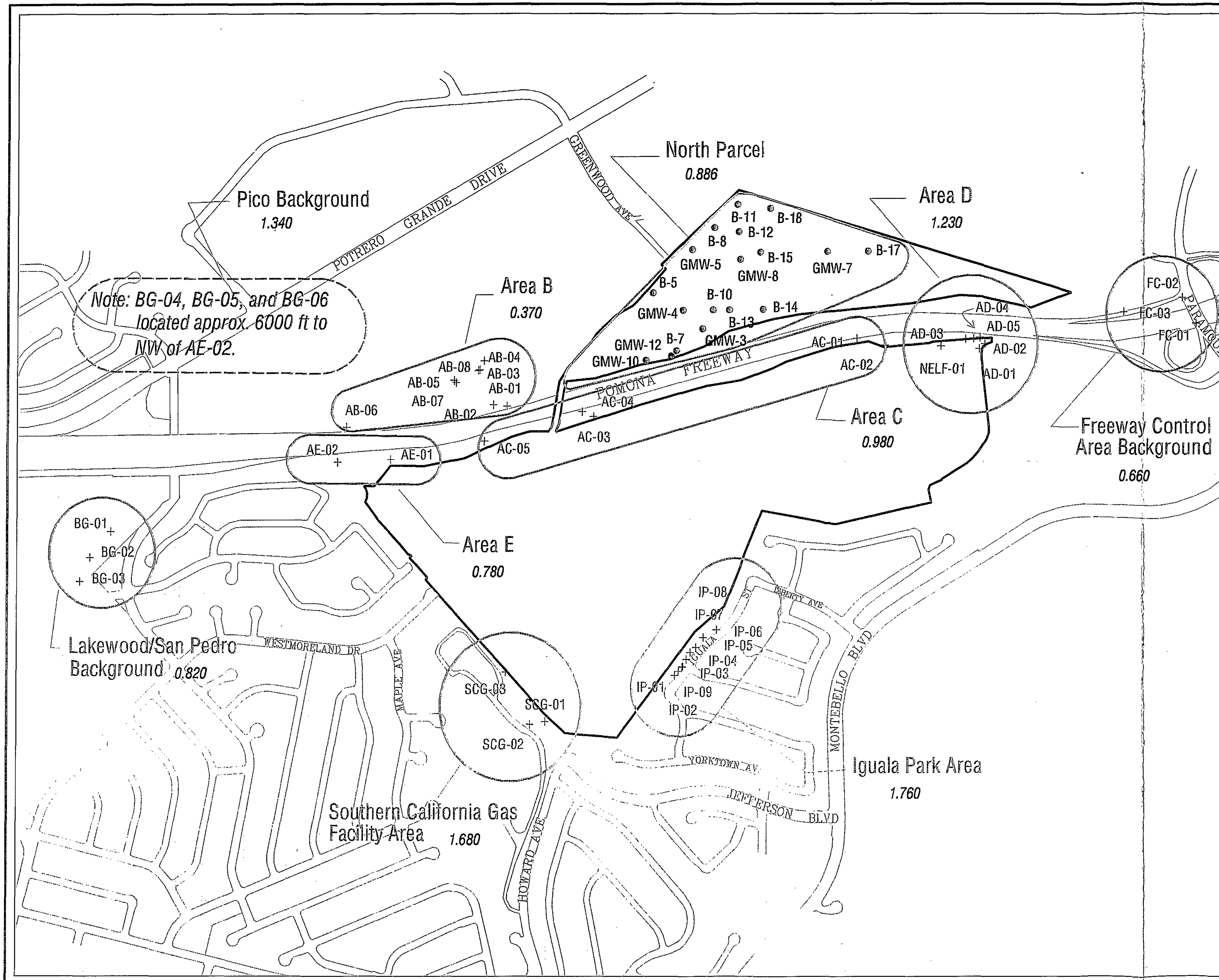
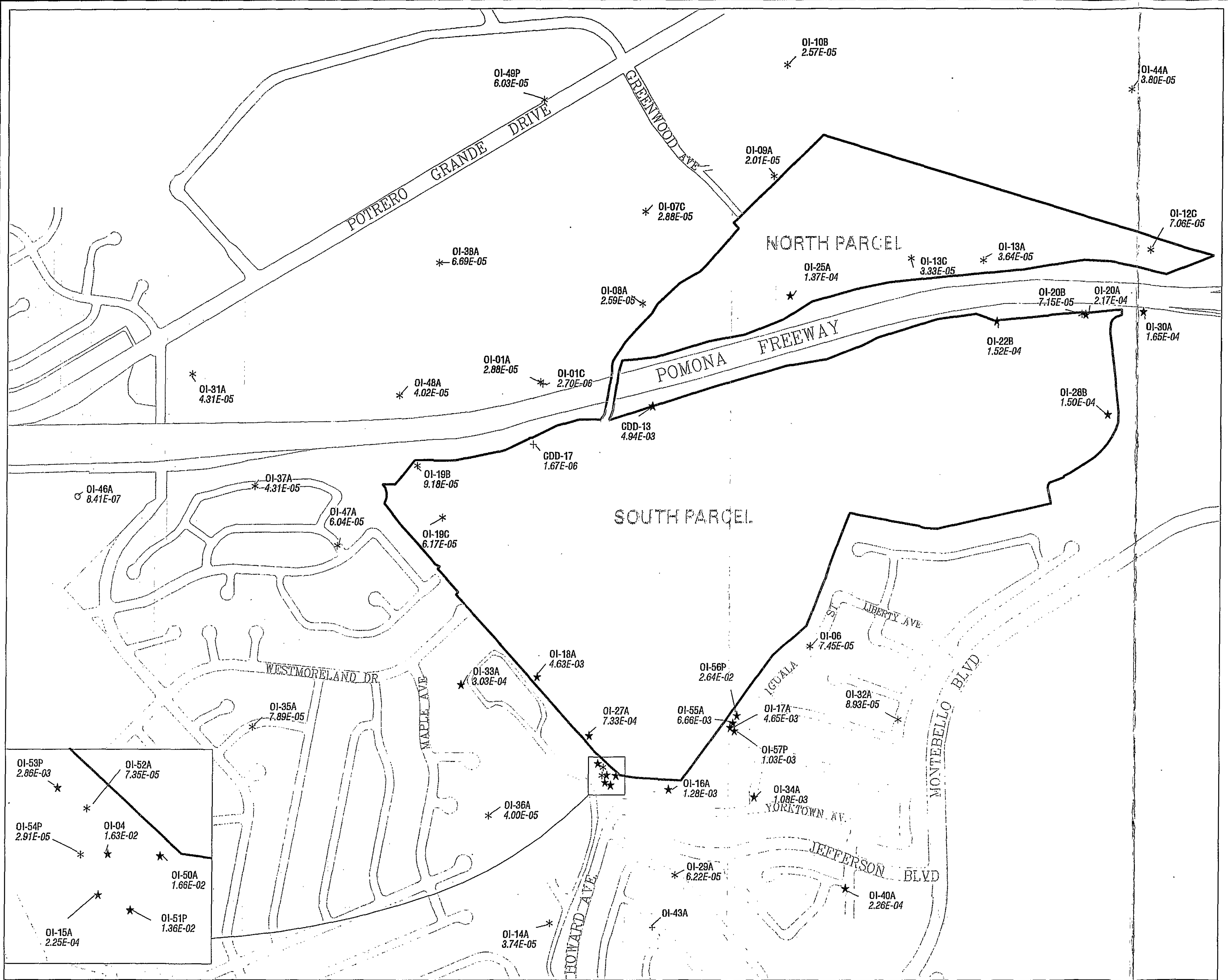


Figure 11
Total Noncancer Hazard Index for Surface Soil/Sediment by Area Residential Child Reasonable Maximum Exposure Conditions

OII Site Final Record of Decision

20 Sep 96 12:02:59 Friday
/GIS4/OII/PLOTS/FIG11.AML



0 250 500 1000
SCALE IN FEET

Legend:

Approximate Location of OII Fence/Property Boundary

Road Boundary

Cancer Risk

PURPLE	★	> 1.00E-4
RED	*	1.00E-5 - 1.00E-4
GREEN	+	1.00E-6 - 1.00E-5
BLUE	o	< = 1.00E-6

NOTE: Risk estimates based on data collected between 1989 and 1993

Figure 12
Total Cancer Risk for Individual Shallow Groundwater Wells Using Chemicals of Potential Concern by Well - Residential Adult Reasonable Maximum Exposure Conditions

24 Sep 96 18:30:50 Tuesday
/GIS4/OII/PLOTS/FIG12.AML

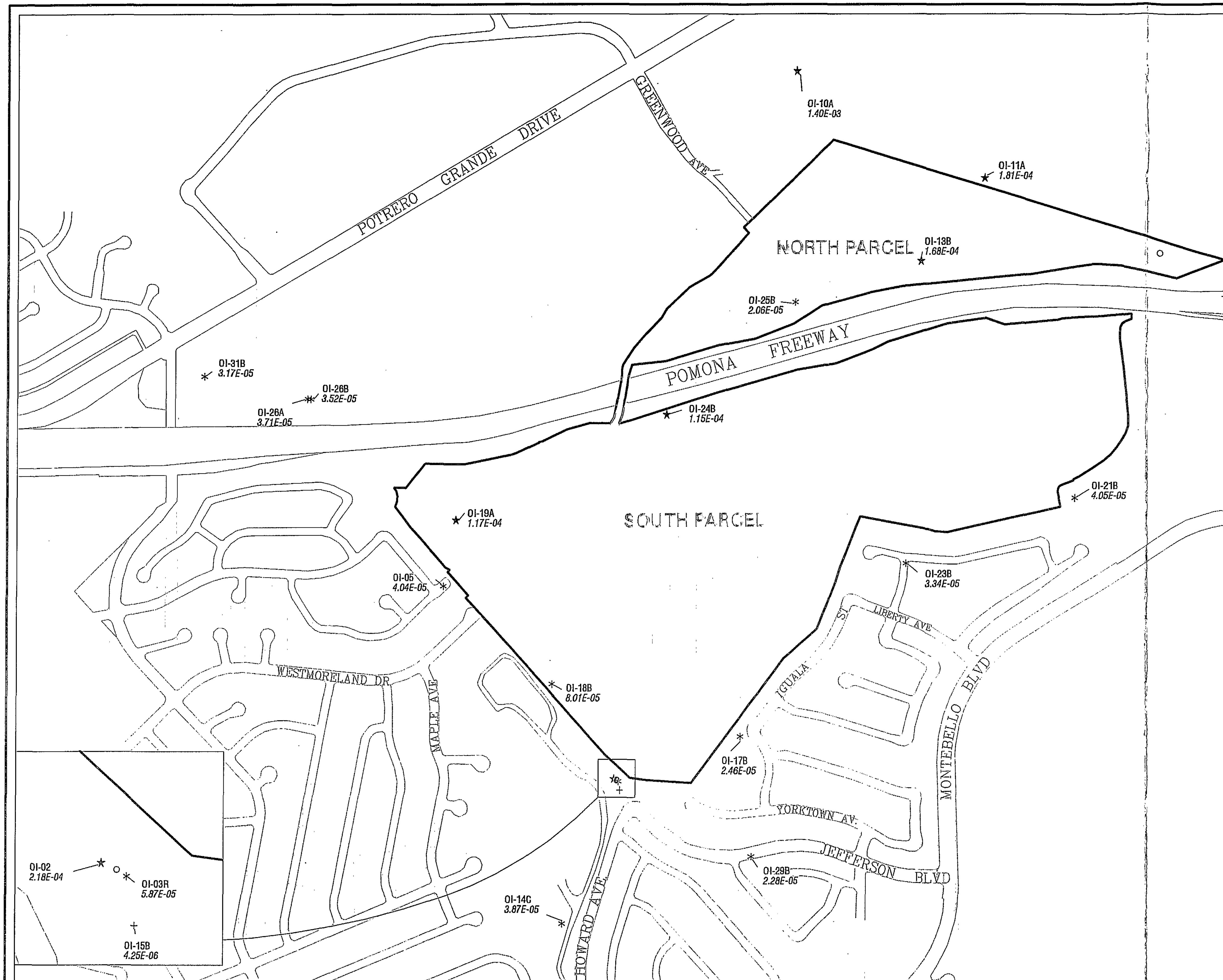
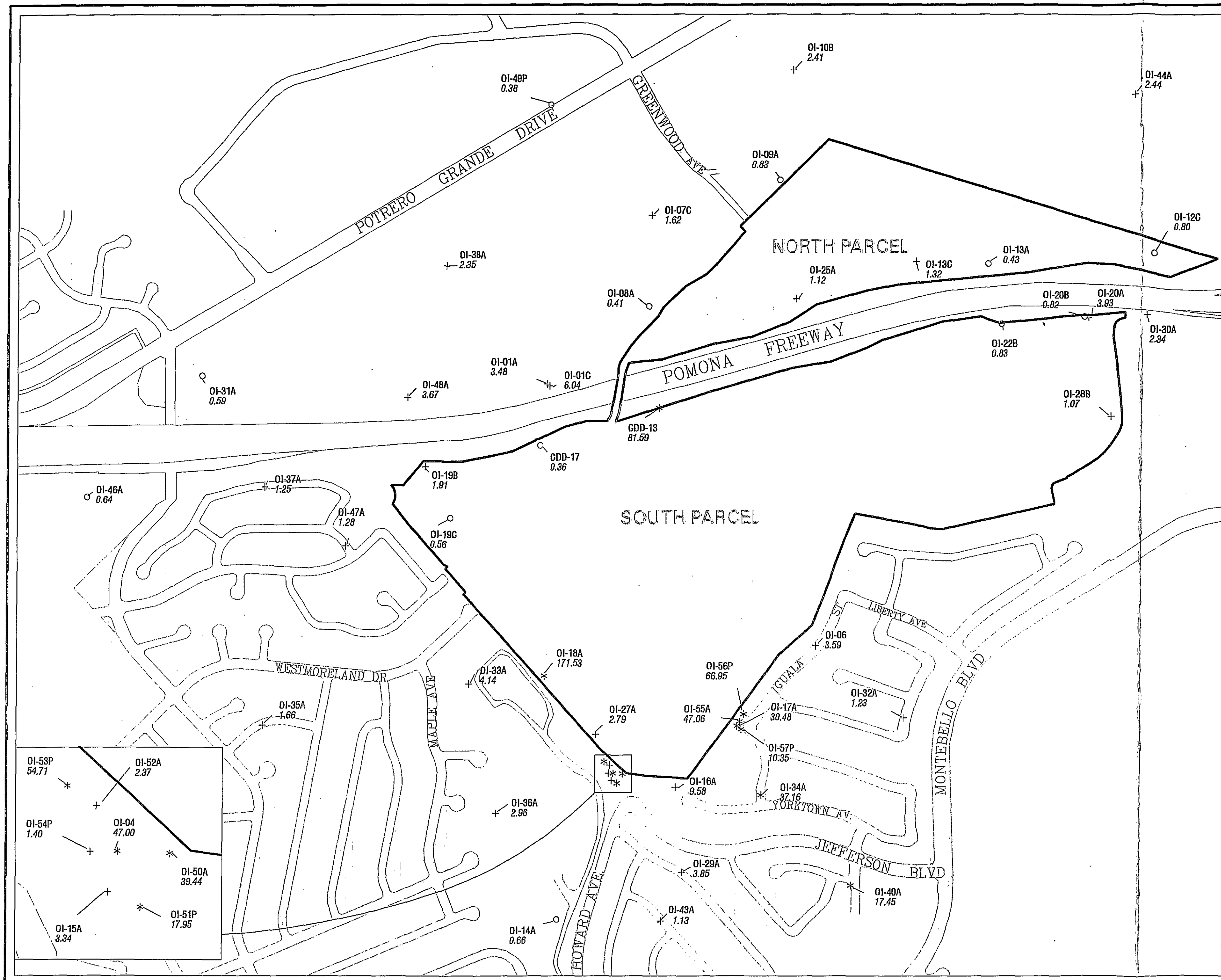


Figure 13
Total Cancer Risk for Individual Deep Groundwater Wells Using Chemicals of Potential Concern by Well - Residential Adult Reasonable Maximum Exposure Conditions

OII Site Final Record of Decision

20 Sep 96 11:37:56 Friday
/GIS4/OII/PLOTS/FIG13.AML



0 250 500 1000
SCALE IN FEET

Legend:

Approximate Location of OII Fence/Property Boundary

Road Boundary

Noncancer Hazard Risk

RED	*	> 10
GREEN	+	1 - 10
BLUE	o	< = 1

NOTE: Hazard index estimates based on data collected between 1989 and 1993

Figure 14

Total Noncancer Hazard Index for Individual Shallow Groundwater Wells Using Chemicals of Potential Concern by Well - Residential Adult Reasonable Maximum Exposure Conditions

20 Sep 96 11:47:27 Friday
/GIS4/OII/PLOTS/FIG14.AML

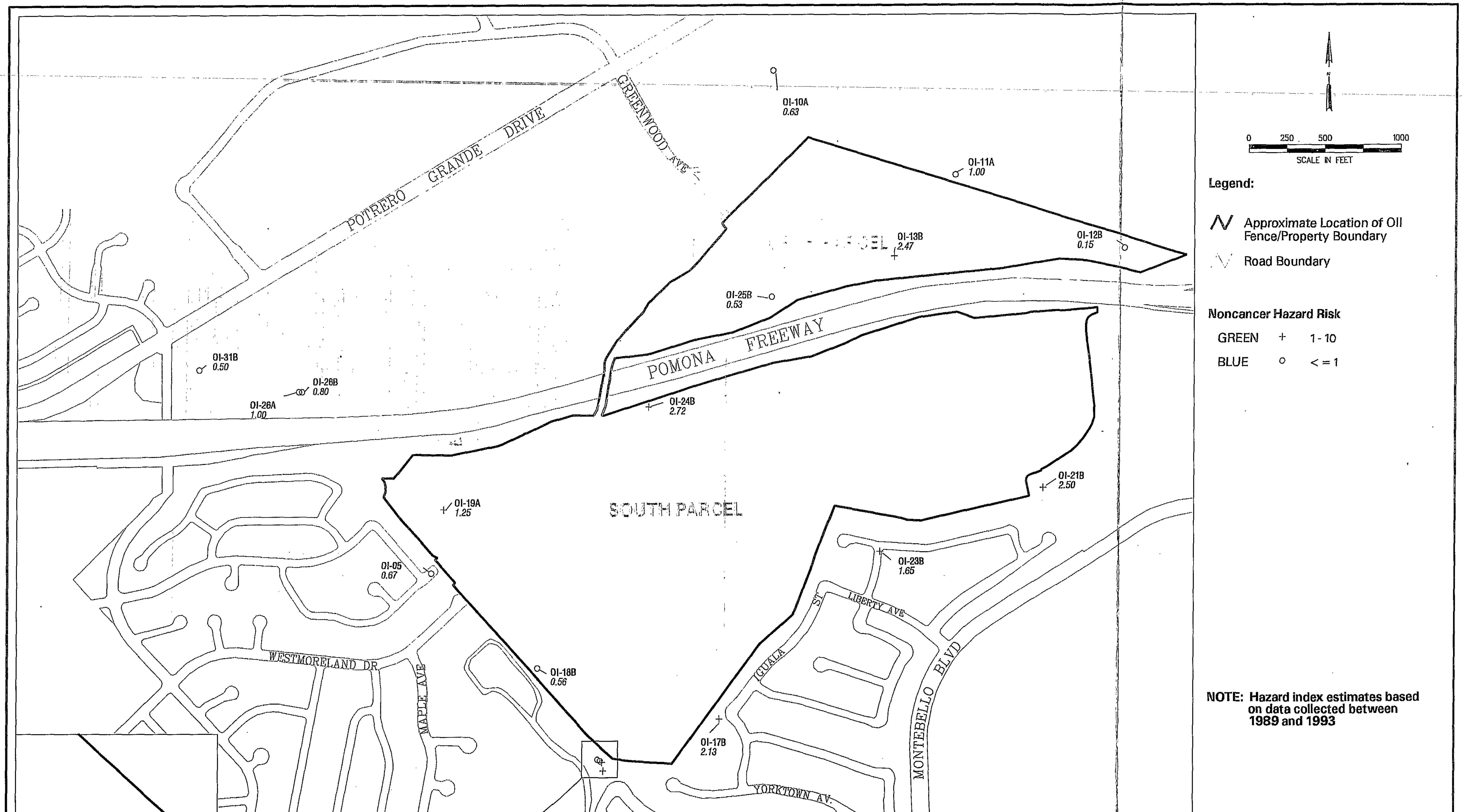


Figure 15
Total Noncancer Hazard Index for Individual Deep Groundwater Wells Using Chemicals of Potential Concern by Well - Residential Adult Reasonable Maximum Exposure Conditions

5.2 Baseline Ecological Risk Assessment Summary

The area surrounding the landfill is heavily developed for mixed general commercial and industrial use, and residential use, with pockets of open space. Potential wildlife corridors between the landfill property and undeveloped areas exist, although they have been reduced and fragmented by development of adjacent lands. The primary wildlife corridor between the South Parcel and the undeveloped Montebello Hills oil field located southeast of the landfill is limited and broken by Montebello Boulevard.

Urban and industrial development around the landfill has replaced most native plants with disturbed or landscaped habitats supporting non-native and ornamental plants. Disturbed areas that are not landscaped support grasses and weedy, ruderal plants. During a reconnaissance visit in February 1994, an observer noted signs of plant stress in limited areas adjacent to the landfill at the Southern California Gas facility and in Iguala Park. Signs of plant stress in non-native plants were observed that included discoloration and deformation in actively growing plant tissues including leaf tips and buds, as well as older leaves and stems. The source of the observed plant stress is not known, but observed plant stress was near historical leachate seeps and areas of recent heavy construction activities.

Wildlife observed at the landfill includes lizards, red-tailed hawks, American kestrels, white-throated swifts, Say's phoebe, California towhee, western meadowlarks, loggerhead shrikes, and American goldfinch. Mobile wildlife such as hawks, kestrels, shrikes, and other birds can easily move to and from the landfill using the scattered trees and vegetation for shelter. Other wildlife expected to occur at the landfill include owls, raccoons, and coyotes. These species may move at night and may be less reliant on intact corridors for movement.

Species of special concern that have been observed at the landfill site include white-tailed kite, Cooper's hawk, blue-grey gnatcatcher, and loggerhead shrike (CDM Federal, 1994). The only special-status species observed during the February 24, 1994, reconnaissance visit was a loggerhead shrike (a federal Category 2 Candidate species).

EPA evaluated ecological exposure pathways assuming a "modified no action" scenario. This scenario assumed continued operation of the existing control systems. As part of the streamlining process, exposure to the landfill contents and landfill contaminant sources were not considered complete pathways because the landfill gas migration control and landfill cover systems called for in the Gas Control and Cover ROD will eliminate this pathway.

Ecological pathways of exposure to contaminants released to ambient air were considered incomplete for onsite emissions because of planned installation of the landfill gas collection system and the landfill cover. Offsite exposure to air emissions by terrestrial wildlife and plants was limited to dust emissions from areas that would not be included in the landfill cover.

Exposure of plants to contaminants in groundwater via root uptake is considered incomplete in all areas except in a limited area at the southwestern corner of the South Parcel near the Southern California Gas facility. In this area, groundwater is approximately 15 feet below ground surface adjacent to the site, dropping to more than 75 feet below ground surface approximately 400 feet away from the waste prism. Groundwater levels in all other areas around the OII Site are generally more than 40 feet below ground surface.

Ecological pathways of exposure to contaminants in surface water runoff were considered incomplete for onsite and offsite areas. Surface water runoff in the area is primarily from irrigation, although storm water runoff occurs with significant precipitation events. Surface water transport of contaminants from the site to the surface water/storm water collection systems will be limited or prevented by installation of the landfill cover, thus making offsite exposure unlikely.

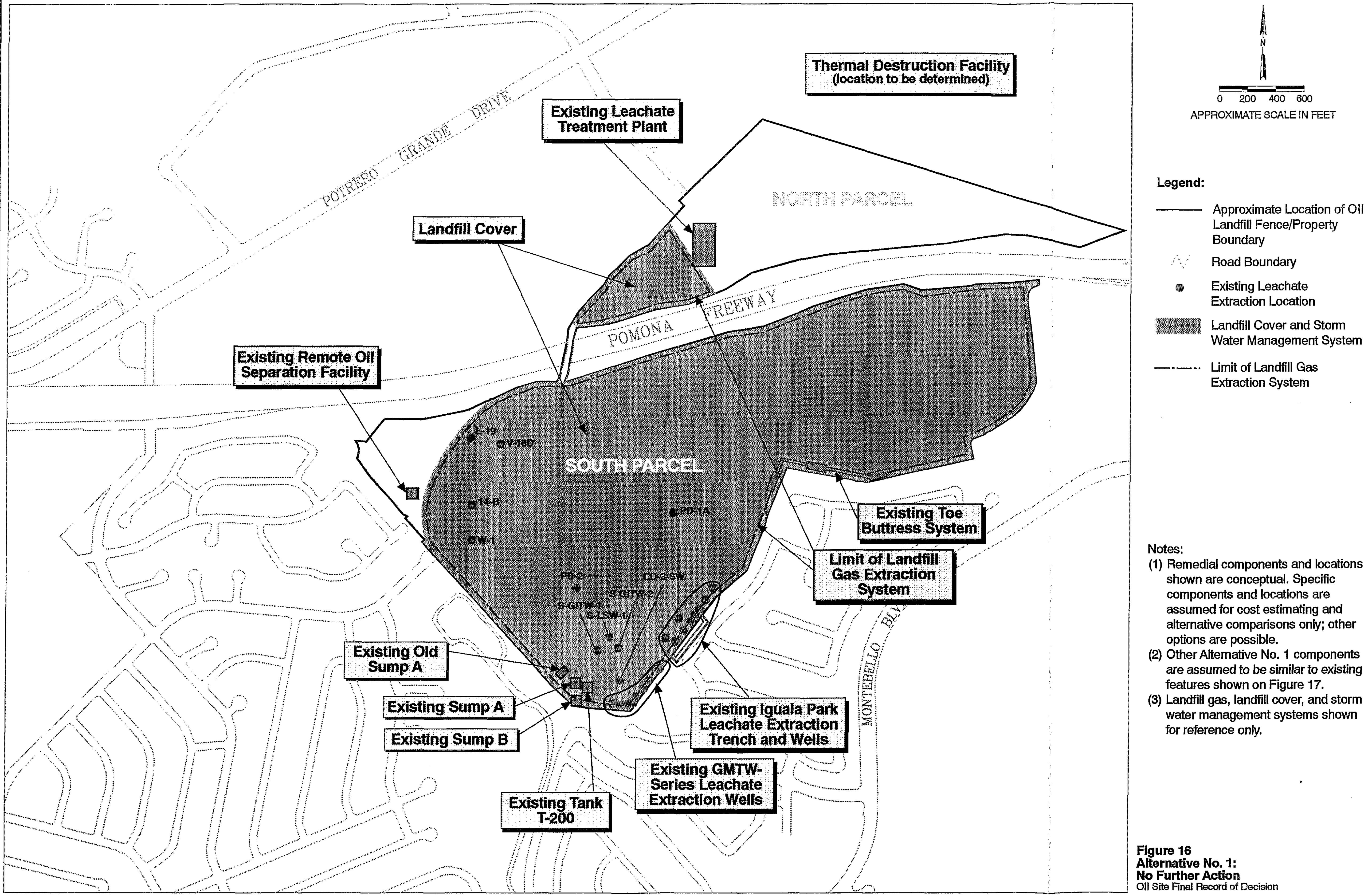
Under the modified no-action scenario, ecological exposure to contaminants in leachate seeps through direct contact are incomplete for both onsite and offsite areas.

6.0 Description of Remedial Alternatives

6.1 Alternative No. 1—No Further Action

Alternative No. 1 consists of implementing remedial measures similar to the leachate management, site control, and monitoring activities currently performed at the site. Alternative No. 1 assumes implementation of the remedial measures stipulated in the Gas Control and Cover ROD. The objective of Alternative No. 1 is to provide an increased degree of protectiveness of human health and the environment than is currently present at the site by continuing to operate; maintain; and, as necessary, improve or replace existing landfill systems. Because the existing system does not control migration of landfill contaminants to groundwater, it would continue to occur in Alternative No. 1. Alternative No. 1 satisfies the NCP requirement for inclusion of a no-action or no-further-action alternative.

Alternative No. 1 Description. Alternative No. 1 includes operation and maintenance of existing site activities (gas extraction and air dike, leachate collection, leachate treatment, irrigation, access roads, stormwater drainage, site security, slope repair, and erosion control), except to the extent that they are addressed under the Gas Control and Cover ROD. Landfill gas and landfill cover components were selected as part of the Gas Control and Cover ROD and are not reselected or modified in this ROD. Implementation of the Gas Control and Cover ROD is assumed in the analysis of this alternative. Major remedial components of Alternative No. 1 are presented in Figures 16 and 17, and are described below. Specific



Notes:
(1) Remedial components and locations shown are conceptual. Specific components and locations are assumed for cost estimating and alternative comparisons only; other options are possible.
(2) Other Alternative No. 1 components are assumed to be similar to existing features shown on Figure 17.
(3) Landfill gas, landfill cover, and storm water management systems shown for reference only.

Figure 16
Alternative No. 1:
No Further Action
OII Site Final Record of Decision

m109994.16.01 alt1B/2 8/96

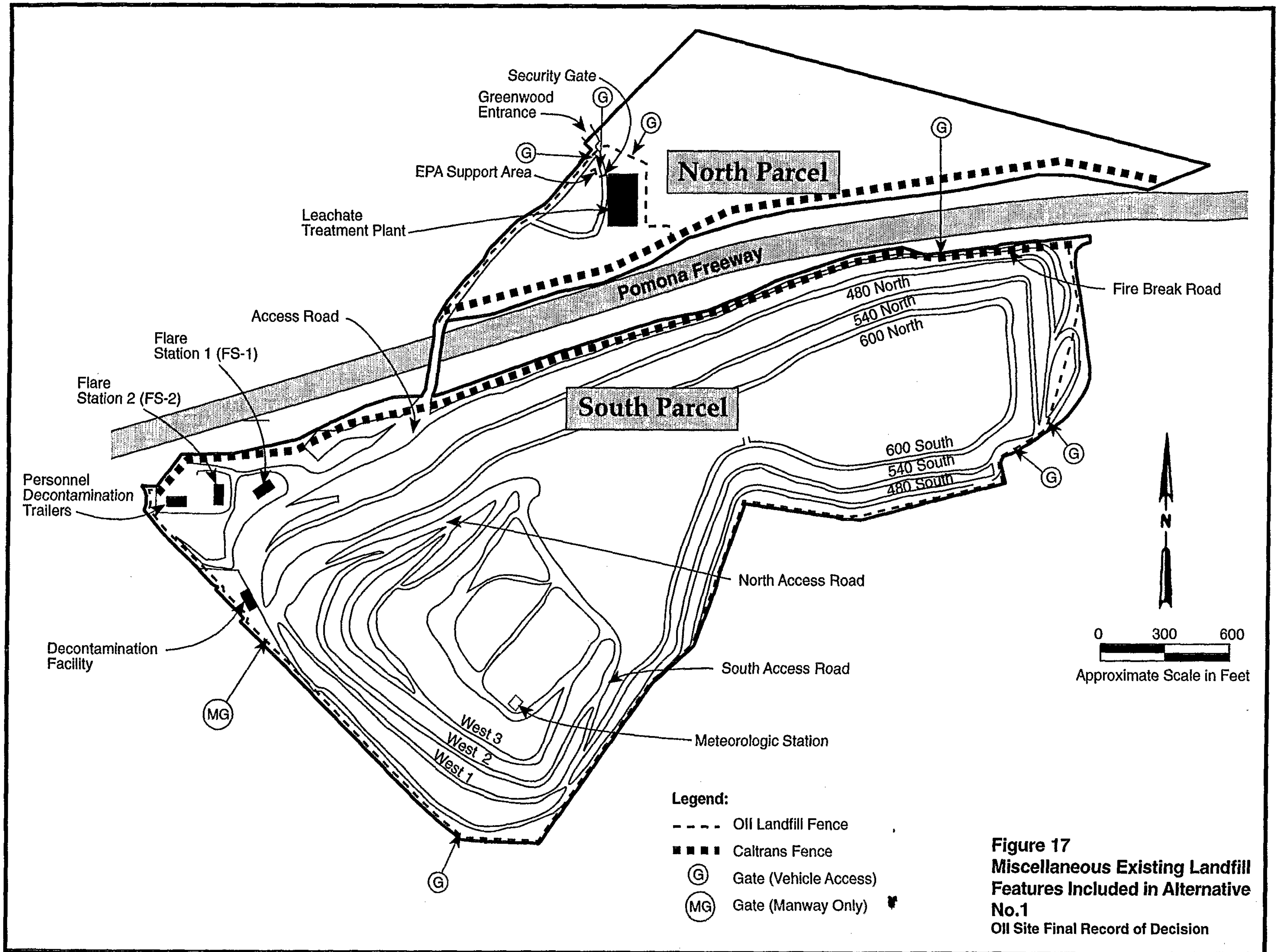


Figure 17
Miscellaneous Existing Landfill Features Included in Alternative No.1
OII Site Final Record of Decision

m109994.16.01 site layout 8/96

remedial alternative components or technologies presented in this section are intended only to serve as representative examples of possible measures that could be taken to achieve the objectives of Alternative No. 1 and to estimate costs. Other viable remedial measures may be evaluated as part of the remedial design activities for the site.

Leachate Collection, Conveyance, and Landfill Liquids Treatment. The objective of leachate management for Alternative No. 1 is to control and prevent leachate from migrating offsite as surface seeps. Leachate management for Alternative No. 1 would consist of operation and maintenance of the existing leachate collection system and, if necessary, upgrades or replacement to improve operability, maintainability, and reliability of the system. Leachate management is currently performed in select areas of the South Parcel only; there is no leachate management on the North Parcel.

The existing South Parcel leachate collection and conveyance system is intended primarily to capture leachate on the landfill slopes and near the landfill boundary (EPA, 1994c). The existing system would be operated and maintained until the landfill cover is operational. Active near-surface leachate collection may cease if the completed landfill cover is adequate to manage liquids that are currently collected in those systems and if surface seeps cease. Leachate is currently, and would continue to be, collected from existing extraction wells in the interior portions of the South Parcel. Leachate would also continue to be collected from other existing perimeter leachate collection systems such as the Iguala Trench.

Leachate, condensate, and other liquids collected would be conveyed to the existing leachate treatment plant (Figure 16). Operation and maintenance of the leachate treatment plant should be required under Alternative No. 1. Constituent concentrations would be reduced to below discharge limits so that the treated landfill liquids could be discharged to the County Sanitation Districts of Los Angeles County sanitary sewer system. After discharge to the County Sanitation Districts of Los Angeles County system, the landfill liquids would undergo additional treatment downstream in the municipal sewer treatment system. The total treatment plant influent flow rate for Alternative No. 1 is estimated at approximately 5.5 gallons per minute (7,850 gallons per day).

The Alternative No. 1 treatment process would consist largely of the existing OII Site leachate treatment plant with some minor process enhancements (polymer addition to the sequential batch reactors). However, these treatment processes serve only as examples of processes that could be appropriate to treat landfill liquids.

Limited initial leachate treatment system operating data suggest that effluent from the sequential batch reactors would meet discharge requirements without further treatment. However, pesticides are capable of passing through biological processes, such as the sequential batch reactors. Because current operating data are limited, and because there is a potential for pesticide pass-through, use of the existing sand filtration and carbon adsorption units has been assumed for cost definition of Alternative No. 1.

Administration, Institutional Controls, Site Security, and Facility Maintenance. This section addresses a broad range of remedy components not specifically covered by other control activities. Many of the administration, site security, and facility maintenance activities described in this section are similar to activities currently performed as part of site control and monitoring activities.

Administration. The purpose of administrative activities would be to manage staff, order equipment, and perform other administrative functions to ensure that performance standards are met. Health and safety monitoring and enforcement, employee training, budget administration, administration building operation and maintenance, performance reporting, and payment of applicable taxes would also be included in this remedial activity. Other miscellaneous activities are included in this section, including meteorological monitoring and collection and conveyance of decontamination water to the leachate treatment plant.

Institutional Controls. Institutional controls would be used as appropriate to supplement engineering controls for short- and long-term management to prevent or limit exposure to hazardous substances, pollutants, or contaminants, and to ensure the effectiveness of remedial actions. The primary objectives of institutional controls are to (1) limit human exposure to potentially contaminated materials onsite (e.g., leachate, landfill contents, and groundwater); (2) prevent trespassing onto the landfill; and (3) protect the integrity of the landfill closure and remedial action components.

North Parcel Areas Not Used as a Landfill or for Site-Related Facilities. EPA determined that no landfill-related risks are posed by soils in the areas of the North Parcel not containing landfill-related wastes nor used for site facilities (the "nonlandfill areas"). Therefore, no further action is required for soils in the nonlandfill areas. Institutional controls and, potentially, engineering controls will be required for contaminated groundwater and, potentially, liquids control on the North Parcel.

Site Security. The purpose of site security activities at the OII Site is to limit access to the site and protect the integrity and operation of the implemented control systems. This activity would be accomplished through use of guards, fences, gates, lighting, and alarms.

Facilities Maintenance. Facilities at the OII Site included in this section are: access roads, road and identification signs, buildings, utilities, aesthetic landscaping, equipment, and trucks. Activities associated with these facilities would include routine maintenance and operation. These activities would be in addition to operation and maintenance of specific landfill components described above.

Postconstruction Environmental Monitoring. The objective of the Alternative No. 1 environmental monitoring program would be to collect sufficient information to assess the degree of protectiveness provided by the environmental control systems and to determine whether performance standards are being met. Additionally, routine monitoring would be performed to facilitate efficient operation and maintenance of the landfill control components. The objective of long-term groundwater monitoring would be to evaluate changes to groundwater contaminant concentrations and to the lateral and vertical extent of groundwater contaminant migration.

6.2 Alternative No. 2—Perimeter Liquids Control (EPA's Selected Remedy)

Alternative No. 2 includes construction of new liquids control systems along the perimeter of the landfill in areas of known or suspected landfill liquids migration, and treatment and discharge of liquids collected in these systems. Alternative No. 2 incorporates all components of Alternative No. 1, except for portions of the existing leachate collection systems after the perimeter liquids control system is operational.

The objective of Alternative No. 2 is to provide control of liquids at the landfill perimeter, as well as to attain the objectives of Alternative No. 1. This alternative would prevent migration of contaminants from the landfill to groundwater at the landfill perimeter at levels that impair water quality and/or represent a threat to human health and the environment. By preventing further offsite landfill liquids migration, this alternative minimizes further groundwater contamination from landfill liquids. Perimeter liquids control would also protect human health and the environment by minimizing offsite exposure to landfill contaminants, minimizing volatilization of landfill contaminants into air, and preventing additional near-site soil contamination. Contaminant concentrations in groundwater beyond the landfill boundary would be reduced to below cleanup standards through natural attenuation. Groundwater would be monitored to ensure that natural attenuation is progressing as anticipated. Institutional controls would be used to prevent exposure to contaminated groundwater.

Alternative No. 2 Description. EPA assessed available monitoring data to determine areas in which perimeter liquids control may be needed. The areas of concern include the western perimeter of the South Parcel; the northwest corner of the South Parcel; and, to a more limited extent, the far eastern perimeter of the South Parcel.

A representative conceptual design for Alternative No. 2 is illustrated in Figure 18. Other technologies and extraction configurations are possible and may be explored during remedial design. This section presents a description of the conceptual design of Alternative No. 2 used for evaluations in the Feasibility Study.

Applicable Components of Alternative No. 1. All of the components from Alternative No. 1 would be included in Alternative No. 2. The perimeter liquids control system may make portions of the leachate collection system included under Alternative No. 1 unnecessary.

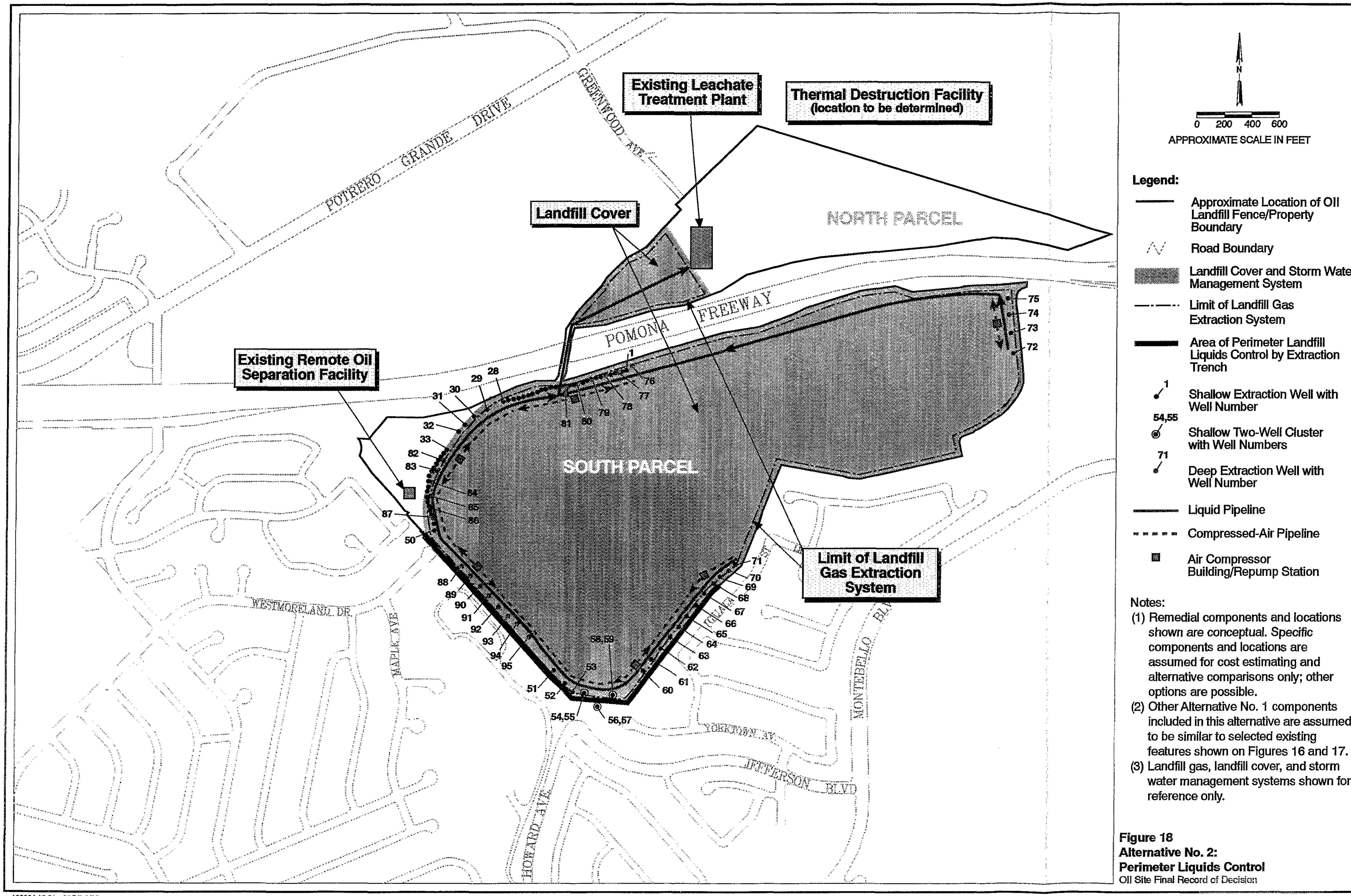


Figure 18
Alternative No. 2:
Perimeter Liquids Control
OII Site Final Record of Decision

Perimeter Liquids Control, Conveyance, and Treatment. A perimeter liquids control system would be installed in areas where contaminant levels in groundwater exceed performance standards.

The conceptual design of the perimeter liquids control system at the OII Site includes 95 extraction wells (shallow and deep) in addition to an extraction trench system along the western and southwestern boundary of the South Parcel. Landfill liquids collected under this alternative would be pumped to the existing leachate treatment plant for treatment. The estimated perimeter liquids extraction rate for this alternative would be 190,100 gallons per day (132 gallons per minute). In addition, about 3,750 gallons per day (2.6 gallons per minute) of landfill liquids (including condensate and other liquids) would be collected.

EPA's evaluations indicate that the existing leachate treatment plant, with some modifications as necessary, would be adequate to treat liquids in Alternative No. 2. The treated liquids would be discharged to the County Sanitation Districts of Los Angeles County sanitary sewer system. After discharge to the County Sanitation Districts of Los Angeles County sanitary sewer system, the liquids would undergo additional treatment in the municipal sewer treatment system.

Remedial Design Investigation. Prior to final design of a perimeter liquids control system, a remedial design investigation would be performed to better characterize both the actual areas where contaminants are migrating beyond the landfill perimeter and the hydraulic properties of the various aquifers or formations at the landfill perimeter. In addition, some additional delineation of the contaminated groundwater areas would be required. The conceptual remedial design investigation would consist primarily of installation and testing of new monitoring wells and collection of liquids samples.

Postconstruction Environmental Monitoring Program. As in Alternative No. 1, EPA would implement a long-term, postconstruction environmental monitoring program with this alternative to collect sufficient information to assess the degree of protectiveness provided by the environmental control systems and to determine whether performance standards were being met. In addition to the monitoring described in Alternative No. 1, the two main objectives of Alternative No. 2 environmental monitoring are (1) to evaluate the effectiveness and performance of the Alternative No. 2 perimeter landfill liquids control system by monitoring liquid levels and contaminant concentrations downgradient of the control systems and (2) to evaluate changes to groundwater contaminant concentrations through natural attenuation and to the lateral and vertical extent of groundwater contamination after placement of the remedial measures.

6.3 Alternative No. 3—Perimeter Liquids Control Plus Source Control

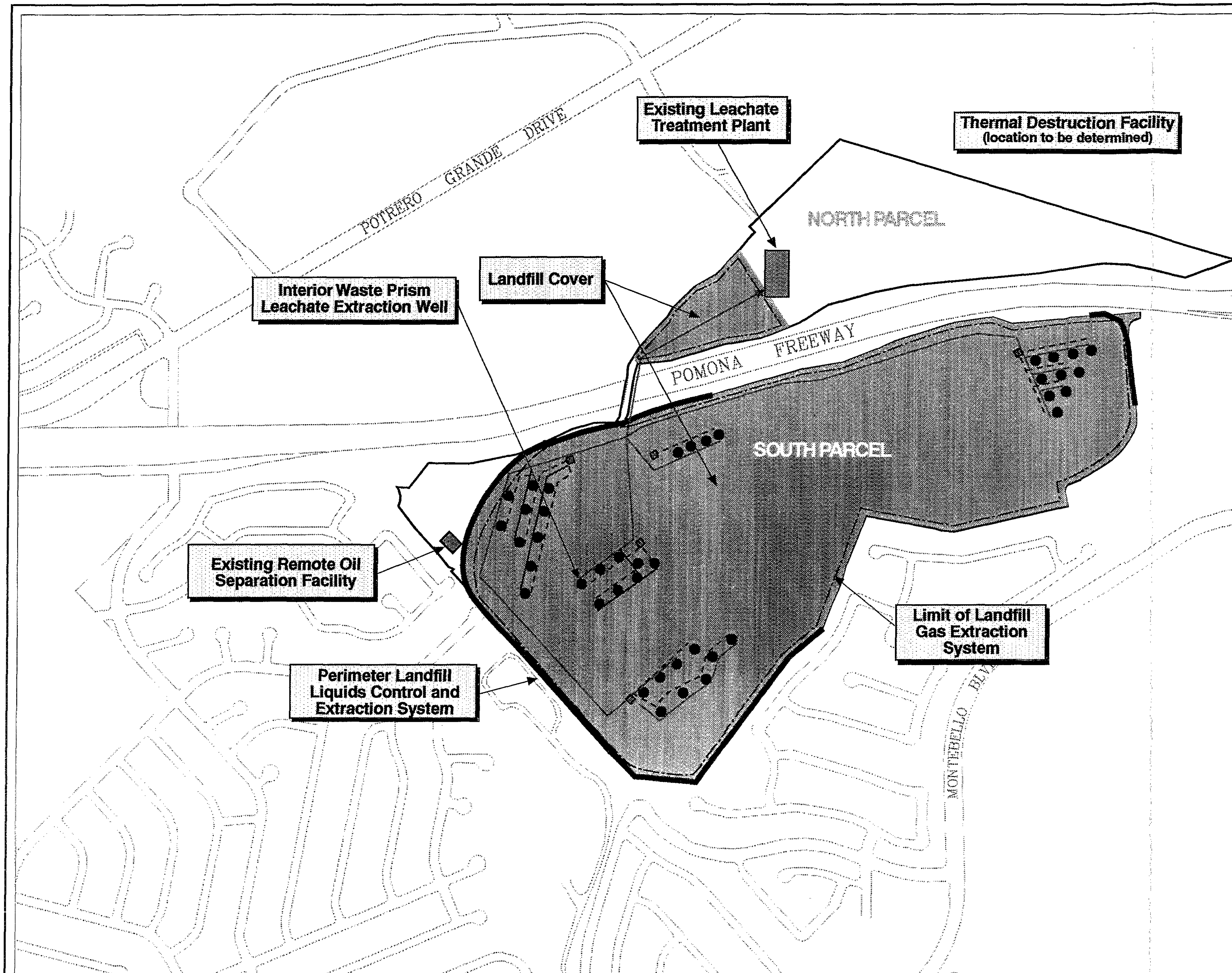
Alternative No. 3 includes new leachate extraction and conveyance systems located within the interior of the waste prism and treatment and discharge of the collected leachate, and incorporates all components of Alternative No. 2.

The objective of Alternative No. 3 is to provide enhanced control of landfill liquids over that presented in Alternative No. 2; to provide additional reduction in toxicity, mobility, and volume; and to potentially reduce the long-term management of liquids, as well as to attain the objectives of Alternative No. 2. In Alternative No. 3, leachate extraction within the waste prism would remove some of the liquids that are currently migrating or that may migrate towards the perimeter of the landfill. One potential benefit of interior leachate extraction would be to provide additional assurances that landfill contaminants would be contained, especially for any areas where perimeter liquids control would be technically challenging. Extracting leachate from the interior of the landfill may reduce the period of time required to operate the perimeter liquids control system, and it may reduce the long-term flow rate into the perimeter system. Extracting interior leachate would also potentially reduce long-term management of liquids at the site, potentially satisfying the NCP goal of reducing the need for long-term management through removal and destruction of toxic and/or mobile contaminants to a greater extent than Alternative No. 2.

Alternative No. 3 Description. EPA interpreted various landfill data to provide a basis for estimating the location of potentially saturated zones, the volume of leachate present and potentially extractable, its ability to migrate, potential migration pathways, and potential impacts to groundwater. EPA targeted potentially saturated zones for leachate extraction that were considered a potential threat to groundwater. The total volume of leachate targeted for extraction is approximately 113 million gallons. This represents about 76 percent of the total potentially extractable leachate (estimated at 145 million gallons), but only about 13 percent of the estimated total volume of leachate in the waste prism (871 million gallons).

Figure 19 illustrates a representative conceptual design for Alternative No. 3. Other technologies and extraction configurations are possible. A description of the conceptual design of Alternative No. 3 follows.

Interior Leachate Extraction, Conveyance, and Landfill Liquids Treatment. Vertical extraction wells are assumed to be the most effective technology for interior leachate extraction in Alternative No. 3. The number of wells assumed for a particular area is influenced by the saturated thickness, geometry of the bottom of the extraction area, and the anticipated well yield and targeted extraction volume (i.e., the quantity of leachate each well is anticipated to produce compared to the total volume to be extracted).



Notes:
(1) Remedial components and locations are conceptual. Specific components and locations are assumed for cost estimating and alternative comparisons only; other options are possible.
(2) All components in Alternative No. 2 (Figure 18) are assumed to be included herein. Other features are assumed to be similar to selected existing features shown in Figures 16 and 17.
(3) Landfill gas, landfill cover, and storm water management systems shown for reference only.

Figure 19
Alternative No. 3:
Perimeter Liquids Control plus Source Control
OII Site Final Record of Decision

m109994.16.01 prich2 8/96

Alternative No. 3 would involve collection and treatment of both interior leachate (estimated to be approximately 20.5 gallons per minute initially) and perimeter liquids (estimated at about 135 gallons per minute). The existing leachate treatment system would be augmented with new process equipment for perimeter liquids (Alternative No. 2) because separate treatment of the more concentrated interior leachate would almost fully utilize the existing process equipment. The two treatment streams would be combined into the existing outfall and discharged to the County Sanitation Districts of Los Angeles County sanitary sewer system. After discharge to the County Sanitation Districts of Los Angeles County sanitary sewer system, all of the liquids would undergo additional treatment in the municipal sewer treatment system.

Remedial Design Investigation. Implementation of Alternative No. 3 would require additional field investigations of the extent of extractable leachate, hydraulic properties of the waste prism, and sustainable yields of extraction wells because of the inherent complexity of the waste prism.

Postconstruction Environmental Monitoring. The objective of the Alternative No. 3 postconstruction environmental monitoring program would be to collect sufficient information to assess the degree of protectiveness provided by the environmental control systems and to determine whether remedial objectives and performance standards are met.

6.4 Alternative No. 4—Perimeter Liquids Control Plus Groundwater Control or Remediation

Alternative No. 4 includes control of contaminated groundwater, and, as an option, remediation of contaminated groundwater. It also incorporates all components of Alternative No. 2, or, as an option, Alternative No. 3. The objective of Alternative No. 4 is to control areas of contaminated groundwater exceeding cleanup standards, as well as to attain the objectives of Alternative No. 2, or, as an option, Alternative No. 3. Alternative No. 4A is intended to contain and prevent further migration of contaminated groundwater. Alternative No. 4B is intended to contain and, where feasible, remediate or restore groundwater within a shorter time period through more aggressive groundwater collection.

Alternative No. 4 Description. EPA used data from existing shallow and deep monitoring wells at the OII Site to define the areas of concern potentially requiring groundwater control at the downgradient boundary.

A conceptual design for Alternative No. 4 is illustrated in Figure 20. Other technologies and extraction configurations are possible. A description of the conceptual design of Alternative No. 4 follows.

All Components of Alternative No. 2 or Alternative No. 3. As discussed above, Alternative No. 2 includes perimeter liquids control. Alternative No. 3 adds extraction of leachate from the interior of the landfill. For purposes of discussion herein, it has been assumed that Alternative No. 4 would include all remedial components from Alternative No. 2. However, if Alternative No. 4 were selected for this remedy, it could also include leachate extraction from some or all of the Alternative No. 3 extraction areas.

Control or Control/Remediation of Contaminated Groundwater. Alternative No. 4A includes control of contaminated groundwater in the following locations: northwest and west of the northwestern corner of the South Parcel, north of the North Parcel, west of the western perimeter of the South Parcel, south and southeast of the southwestern corner of the South Parcel, and east of the northeastern corner of the South Parcel. Alternative No. 4B consists of groundwater control at all of the above areas plus additional extraction in the Northwest Area to more aggressively collect and possibly restore contaminated groundwater within a shorter time period. Assumed depths of collection are based upon known or suspected depths of contamination, recent depth-to-water measurements, and interpreted thickness of confined units.

EPA used groundwater extraction from vertical extraction wells as the representative technology for groundwater containment in the Feasibility Study. The purpose of the extraction wells would be to prevent contaminated liquids from migrating beyond (i.e., downgradient of) the control boundary. Assumed extraction well locations are shown in Figure 20. The estimated groundwater extraction rate for Alternative No. 4A is about 526,600 gallons per day (366 gallons per minute); and for Alternative No. 4B, it is estimated to be 892,900 gallons per day (620 gallons per minute).

Disposal Options for Treated Groundwater. The Feasibility Study evaluated five different options for discharge of the extracted and treated groundwater. These are sanitary sewer discharge, aquifer injection discharge, surface water discharge, irrigation reuse discharge, and deep well injection discharge. The deep well injection discharge option was eliminated as a feasible discharge option in the Feasibility Study. The remaining four discharge options were incorporated into Alternative No. 4. The total flow rates for discharge under Alternatives No. 4A and 4B would be 501 and 755 gallons per minute, respectively. This would include the perimeter liquids (135 gallons per minute) and the groundwater (366 gallons per minute in Alternative No. 4A and 620 gallons per minute in Alternative No. 4B). It has been assumed in all discharge options that the perimeter liquids portion of Alternative No. 4 (135 gallons per minute) would be discharged to the sanitary sewer.

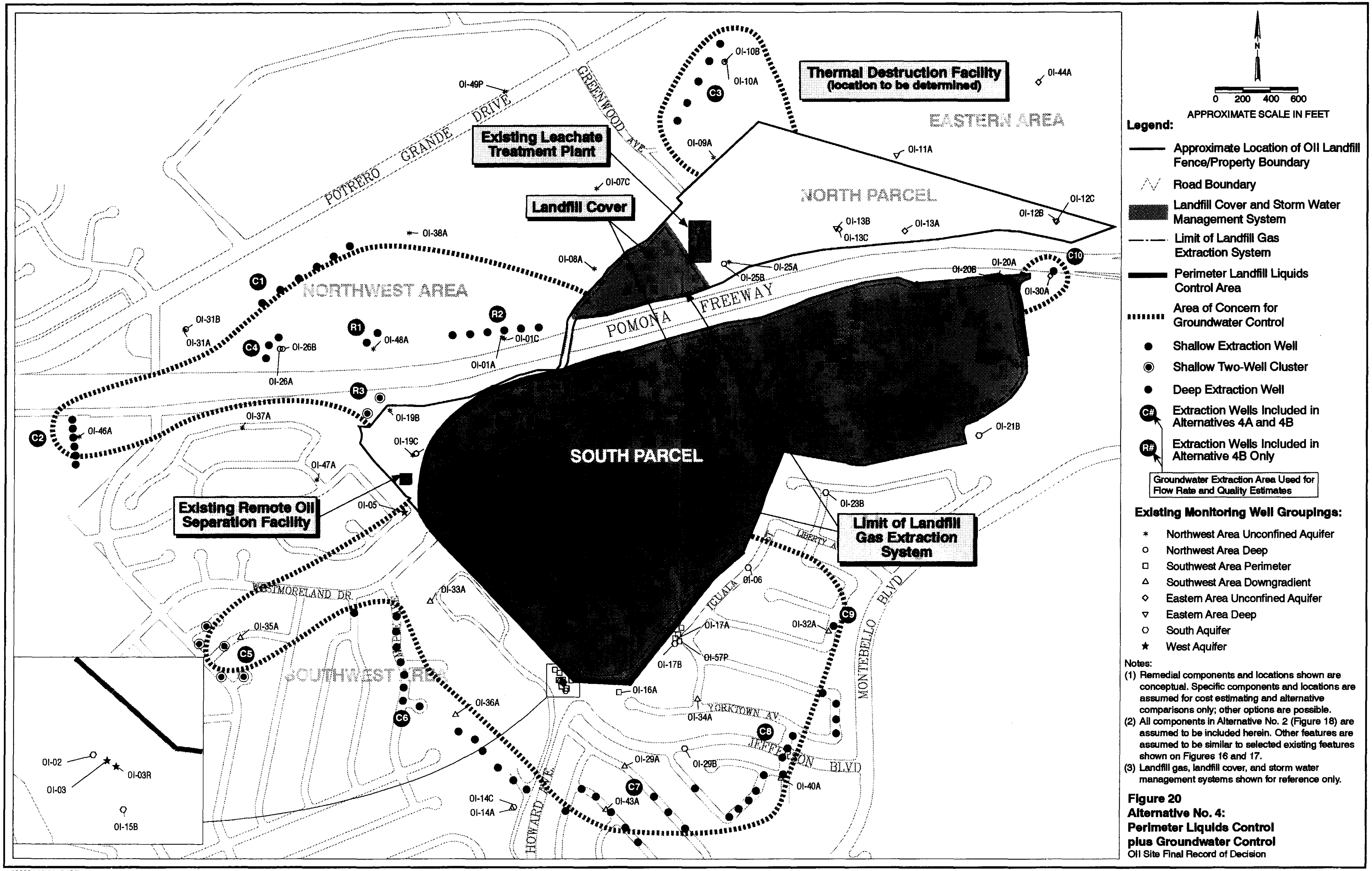


Figure 20
Alternative No. 4: Perimeter Liquids Control plus Groundwater Control
OII Site Final Record of Decision

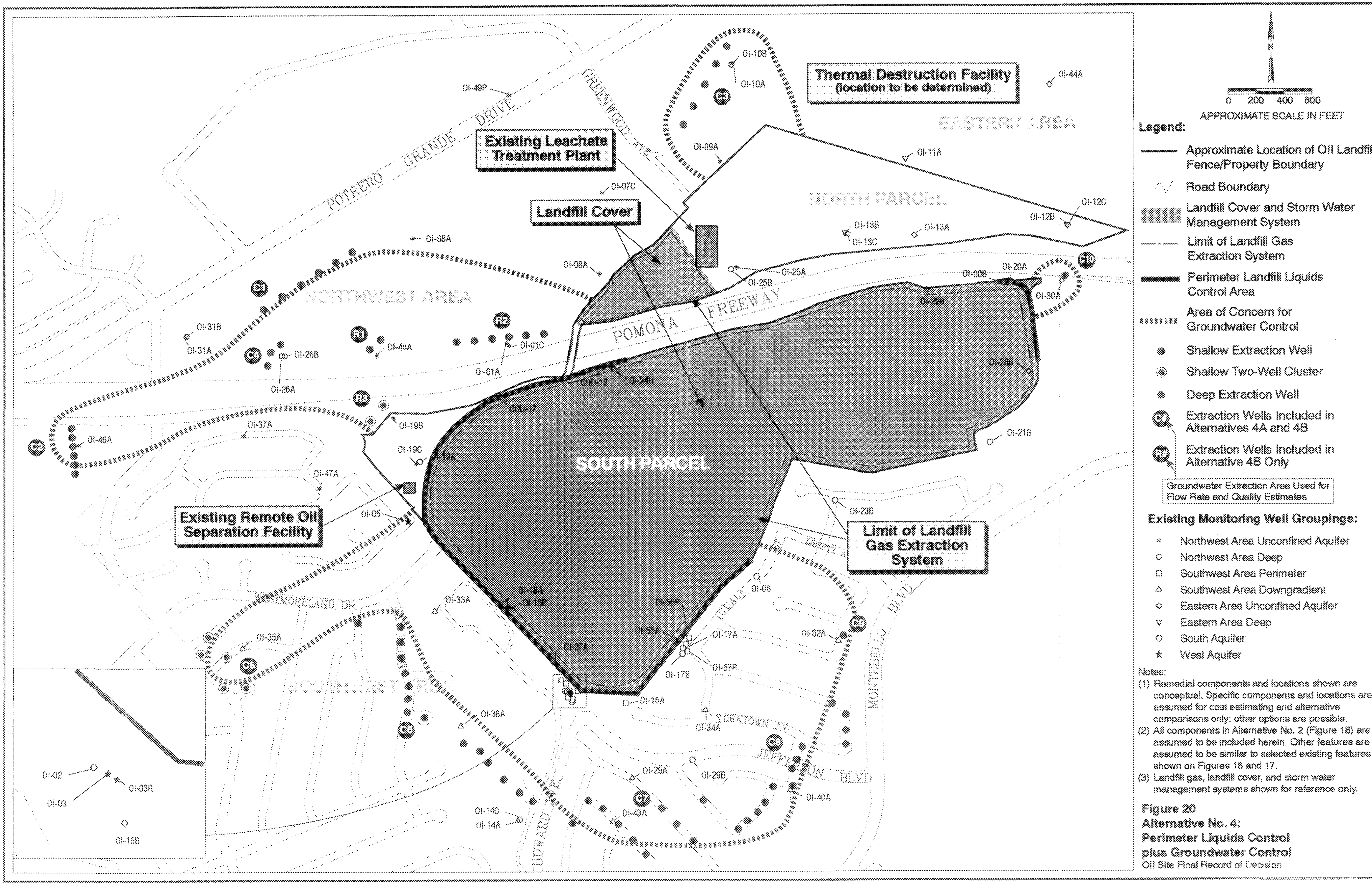


Figure 20
Alternative No. 4:
Perimeter Liquids Control plus Groundwater Control
OII Site Final Record of Decision

m109394.16.01 alt4C/2 8/96

Conveyance. The purpose of the Alternative No. 4 groundwater extraction conveyance system is to transport groundwater from the collection systems to the treatment plant. The conveyance system for Alternative No. 4 extraction would begin at each well and extend to the connection at the treatment plant.

Additionally, a conveyance system would be needed to transport treated liquids from the treatment plant to facilities for each of the four discharge options considered. For sanitary sewer discharge, an additional pipeline would be needed to transport the treatment plant discharge to the County Sanitation Districts of Los Angeles County system at Wilcox Avenue. In addition, in Alternative No. 4B, a pipeline would be needed downstream of the Wilcox Avenue connection to provide additional capacity. Injection wells (likely located northwest of the North Parcel) and associated pipelines would be needed for the aquifer injection discharge option. Discharge under the surface water discharge option would likely be into a drainage in the nursery adjacent to the North Parcel, or potentially into the drainage channel on the south side of the Pomona Freeway. For the irrigation reuse discharge option, a pump station would be required to supply the treated groundwater to the potential recipients of treated water at an appropriate pressure for use in their system. Potential recipients include the surrounding nurseries, cemetery, golf course, and the landfill itself.

Groundwater Treatment. Because discharge standards vary between various discharge options, EPA assumed and evaluated a treatment system for each discharge option. EPA added representative unit processes as required to meet the differing discharge requirements. The perimeter liquids treatment component of Alternative No. 4 would be identical to that presented for Alternative No. 2, so this component is not discussed again in this section.

The conceptual groundwater treatment system consists primarily of new units located at or adjacent to the existing plant because the perimeter liquids would use much of the existing leachate treatment plant capacity.

Remedial Design Investigation. The objective of the remedial design investigation for Alternative No. 4 would be to collect hydrogeologic and lithologic data to refine the design of the proposed groundwater control or remediation systems prior to implementation. For the conceptual remedial design investigation, the types of data that would need to be collected (in addition to those addressed by the Alternative No. 2 remedial design investigation) include the lateral and vertical extent of contamination, hydraulic properties of the affected hydrogeologic units in the offsite areas, potential migration pathways to offsite areas, and long-term sustainable yields of extraction wells.

Postconstruction Environmental Monitoring. Alternative No. 4 incorporates all of the monitoring discussed in Alternative No. 2, except that the offsite groundwater monitoring component would be modified. The objectives of groundwater monitoring in the offsite areas under Alternative No. 4 are to evaluate the effectiveness and performance of the groundwater control/restoration systems and to assess groundwater contaminant migration after the placement of these systems.

7.0 Summary of the Comparative Analysis of Alternatives

This section compares the remedial alternatives described in Section 6. The comparative analysis provides the basis for determining which alternative presents the best balance of EPA's nine Superfund evaluation criteria provided in 40 Code of Federal Regulations Part 300.430 (listed below). The first two cleanup evaluation criteria are considered *threshold criteria* that the selected remedial action must meet. The five *primary balancing criteria* are balanced to achieve the best overall solution. The two *modifying criteria*, state and community acceptance, are also considered in remedy selection.

Threshold Criteria

1. **Overall Protection of Human Health and the Environment** addresses whether an alternative provides adequate protection from unacceptable risks posed by the site.

2. **Compliance with Applicable or Relevant and Appropriate Requirements** (ARARs) addresses whether an alternative attains specific federal and state environmental requirements and state facility siting requirements or provides grounds for a waiver.

Primary Balancing Criteria

3. **Long-term Effectiveness and Permanence** refers to the degree to which an alternative provides reliable protection of human health and the environment over time.

4. **Reduction of Toxicity, Mobility, or Volume Through Treatment** refers to the degree to which an alternative uses treatment to reduce the health hazards of contaminants, the movement of contaminants, or the quantity of contaminants at the site.

5. **Short-term Effectiveness** addresses the degree to which human health and the environment will be adversely impacted during construction and implementation of an alternative.

6. **Implementability** refers to the technical and administrative feasibility of an alternative. This includes technical difficulties and uncertainties and the

availability of materials and services. It also includes coordination of federal, state, and local government efforts.

7. **Cost** evaluates the estimated capital, operation and maintenance, and indirect costs of each alternative in comparison to other equally protective alternatives.

Modifying Criteria

8. **State Acceptance** indicates whether the state agrees with, opposes, or has concerns about the preferred alternative.

9. **Community Acceptance** includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose.

The strengths and weaknesses of the alternatives were weighed to identify the alternative providing the best balance with respect to the nine evaluation criteria.

7.1 Overall Protection of Human Health and the Environment

The NCP requires that all alternatives be assessed to determine whether they can adequately protect human health and the environment, in both the short term and long term, from unacceptable risks. These risks can be mitigated by eliminating, reducing, or controlling exposure to hazardous substances, pollutants, or contaminants. Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. Reduction of toxicity, mobility, and volume is another important criterion for this overall evaluation. An overall summary of the criteria, as they relate to protectiveness of human health and the environment, is presented in Table 10.

7.1.1 Alternative No. 1

Of all the alternatives, Alternative No. 1 is the least protective of human health and the environment. Because landfill contaminants would continue to migrate into the groundwater, Alternative No. 1 would not protect groundwater resources nor adequately protect future human exposure to contaminated groundwater. Alternative No. 1 would not comply with ARARs for landfill closure and groundwater protection, which require that landfill contaminants not escape from the landfill into groundwater and other media and require cleanup of groundwater to acceptable levels. Also, Alternative No. 1 would also fail to meet CERCLA Section 121(d), which generally requires groundwater remedies affecting potential drinking water sources to attain drinking water standards.

Table 10
Comparison of Overall Protection of Human Health and the Environment
OII Site Final Record of Decision

Evaluation Criteria	Alternative No. 1	Alternative No. 2	Alternative No. 3	Alternatives No. 4A and 4B	
Long-Term Effectiveness and Permanence					
Magnitude of Residual Risk					
Leachate	Med.	Med.	Low	Med.	
Groundwater	Med.	Med.	Med.	Med.	
Adequacy and Reliability of Controls					
Engineering Controls	Med.	Med./High	Med./High	Med./High	
Institutional Controls/Monitoring	Low/Med.	Med.	Med.	Med./High	
Reduction in Toxicity, Mobility, and Volume Through Treatment					
Estimated Volume of Constituents Removed Through Collection/Extraction				(4A)	(4B)
Inorganic Constituents (tons)	2,700	4,800	11,450	10,500	30,900
Organic Materials (tons)	1,290	2,370	4,780	2,430	2,460
Volatile and Semivolatile Organic Constituents (tons)	40	11	63	12	16
Treatment Residuals Generated (tons)	610	160	1,080	160 - 760	840 - 1,660
Short-Term Effectiveness					
Risk to Community During Implementation	Med.	Med.	Med.	High	
Protection of Workers	Med.	Med.	Med.	Med.	
Time Until Remedial Objectives Achieved[a]	4 to 6 years	5 to 7 years	5 to 7 years	5 to 7 years	
Environmental Impacts	Low	Low	Low	Low	
Compliance with ARARs					
Chemical-Specific ARARs	No	Yes[b]	Yes[b]	Yes[b]	
Time Until Chemical-Specific Remedial Goals Achieved- Inorganics	Unknown (many tens of years longer than Alt. No. 2)	Estimated to range from about 50 years in some areas up to 150 years +/- 50 years in other areas	Estimated to range from about 50 years in some areas up to 150 years +/- 50 years in other areas	Estimated to range from about 20 years in some areas up to 60 years +/- 20 years in other areas	
Time Until Chemical-Specific Remedial Goals Achieved- Organics	Unknown (many tens of years longer than Alt. No. 2)	Estimated to be less than 50 years	Estimated to be less than 50 years	Estimated to be less than 50 years	
Location-Specific ARARs	Yes	Yes	Yes	Yes	
Action-Specific ARARs	No	Yes	Yes	Yes	

[a] For groundwater, the times listed only represent the time until remedial objectives are partially met, through institutional controls and perimeter control (except for Alternative No. 1, which does not have perimeter control); remedial objectives would not be fully met until cleanup goals are achieved (cleanup times are given under chemical-specific ARARs).

[b] There is a potential that inorganics in the Southwest Area may not meet ARARs in a reasonable time (the estimated range of cleanup times is provided above and in Table 11).

Each of the alternatives incorporates institutional controls to protect human health. Alternative No. 1 relies on institutional controls to protect human health from exposure to constituents in groundwater for the longest amount of time and over the largest area. This is because the source would not be controlled and would continue to contaminate groundwater. Due to the lack of perimeter liquids control, the extent of the area that would require institutional controls cannot be reliably predicted, nor can the length of time that institutional controls would be required. These uncertainties make implementation of institutional controls for this alternative more difficult than for any other alternative. Accordingly, Alternative No. 1 is less protective of human health and the environment for groundwater than the other alternatives.

7.1.2 Alternative No. 2

Alternative No. 2 would be significantly more protective of human health and the environment than Alternative No. 1 because, by containing contaminants at the landfill perimeter, there would be no further impact to groundwater. Alternative No. 2 would meet landfill closure and chemical-specific ARARs pertaining to the offsite migration of landfill contaminants and to groundwater cleanup (which are not met by Alternative No. 1). The period of time over which institutional controls would be required is substantially less than Alternative No. 1. The area over which institutional controls would be needed would also be substantially less than Alternative No. 1, although it could potentially extend an additional 600 feet up to 1,000 ±500 feet beyond the current extent of contamination. Alternative No. 2 would comply with all ARARs, although there is a potential that groundwater cleanup for inorganic constituents in the Southwest Area may take an excessive amount of time to reach cleanup standards (because of the complex subsurface conditions).

7.1.3 Alternative No. 3

Alternative No. 3 would have similar protectiveness of human health and the environment as Alternative No. 2. For groundwater, Alternative No. 3 would be almost identical to Alternative No. 2 because the perimeter liquids control system will prevent migration of contaminants to groundwater. Institutional controls would be required for the same amount of time and over the same area as Alternative No. 2. Extracting and treating interior leachate may achieve a slightly higher degree of long-term protectiveness and may reduce the magnitude of residual risk from leachate contained within the landfill. However, the large majority of leachate (approximately 87 percent) would remain onsite under this alternative. Removing a portion of the contaminant source may also slightly enhance the effectiveness of the perimeter liquids control system in preventing migration of contaminants to groundwater, because the amount of leachate migrating to the perimeter may be reduced. Therefore, from a contaminant migration perspective, Alternative No. 3 may be slightly more protective of the environment than Alternative No. 2. Alternative No. 3 would comply with all ARARs, except potentially for groundwater cleanup of inorganics in the Southwest Area (as described above for Alternative No. 2).

7.1.4 Alternative No. 4

Alternative No. 4 would provide the same level of long-term protection from exposure to contaminated groundwater as Alternatives No. 2 and No. 3, except for inorganic contamination. It would be more protective overall than the other alternatives because inorganic contamination would not spread and because extraction of contaminated groundwater would enhance natural attenuation of the inorganic contamination. Alternative No. 4 would have the least reliance on groundwater monitoring and institutional controls because its groundwater control component would minimize the size of the contaminated area (and thus the area required for institutional controls). Active extraction of contamination would achieve cleanup standards for inorganic constituents sooner than other alternatives and therefore minimizes the time required for institutional controls (although institutional controls would still be required for up to 60 years +/- 20 years).

Alternative No. 4 would cause significantly increased impacts on the community surrounding the landfill during remedy implementation because of the large-scale construction activities in the adjacent neighborhoods. These include installation of numerous extraction wells and conveyance systems in residential streets. These construction activities would cause significant noise and disrupt traffic patterns. The alternative would also have long-term adverse impacts, including potential leaks or spills of contaminated groundwater, significant ongoing operation and maintenance activities, and ongoing traffic disruptions.

Alternative No. 4 would comply with all ARARs, although, as with Alternatives No. 2 and 3, there is the potential that groundwater cleanup of inorganic constituents in the Southwest Area may take an excessive amount of time (because of the complex subsurface conditions).

As discussed previously, it is possible that all or portions of the Alternative No. 3 interior leachate extraction systems could be incorporated into Alternative No. 4. The combination of interior leachate extraction plus groundwater control/remediation (Alternative No. 4B) would provide the highest degree of protectiveness of human health and the environment of all the alternatives.

7.2 Compliance with ARARs

This section presents a comparison of alternatives with respect to compliance with chemical-specific, location-specific, and action-specific ARARs.

Chemical-Specific ARARs. Chemical-specific ARARs are health- or risk-based numeric values or methodologies that, when applied to site-specific conditions, result in the establishment of numeric values of the acceptable amount, or concentration, of a chemical that may be found in, or discharged to, the ambient environment. Alternative No. 1 would not meet chemical-specific ARARs pertaining to groundwater cleanup. This is because the landfill source would not be contained and natural attenuation would not effectively reduce either organic or inorganic constituents to cleanup standards within an acceptable time frame. Alternatives No. 2, 3, and 4 would meet chemical-specific ARARs, with the possible exception of inorganic constituents in groundwater in the Southwest Area. Because of the complex groundwater flow conditions and low-permeability formation, there is a potential that inorganic constituents in the Southwest Area may take an excessive amount of time to meet cleanup standards (cleanup of inorganics could require up to 150 +/- 50 years under Alternatives No. 2 and 3 and 60 +/- 20 years in Alternative No. 4). The estimated cleanup times for both organic and inorganic constituents are shown in Table 11 for each of the alternatives.

Location-Specific ARARs. Location-specific ARARs are restraints placed on activities in or impacts on specific areas. It is expected that all of the alternatives would comply with all location-specific ARARs.

Action-Specific ARARs. Action-specific ARARs are technology- or activity-based requirements or standards that apply to specific remedial activities that are conducted as part of the selected remedy. Actions related to the OII Site include construction activities, such as the extraction trench or groundwater extraction wells and leachate collection and treatment systems, and landfill closure requirements. All alternatives involve operation and maintenance of site control systems, and discharges from the treatment systems. With the exception of Alternative No. 1, site control systems in all alternatives could be designed, constructed, and operated to meet federal and state action-specific ARARs. Alternative No. 1 would not meet the federal and state ARARs pertaining to landfill closure, such as the prevention of contaminant migration away from the landfill and protection of groundwater.

7.3 Long-term Effectiveness and Permanence

Long-term effectiveness is evaluated through two criteria: the magnitude of the residual risk remaining after the remedy is implemented and the adequacy and reliability of engineering and institutional controls.

7.3.1 Magnitude of Residual Risk

The magnitude of residual risk is typically gauged by the risks remaining from untreated waste at the conclusion of remedial activities. EPA's guidance on streamlining the remedial investigation/feasibility study for CERCLA municipal landfills recognizes that containment technologies are generally appropriate for landfills containing municipal waste, and that complete treatment of all hazardous constituents (including the landfill contents) is generally

Table 11
Approximate Time to Reach Chemical-Specific ARARs in Groundwater
OII Site Final Record of Decision

Area	Alternative No. 1	Alternative No. 2 (and Alternative No. 3)[a]	Alternative No. 4[b]
Organic Constituents[c]			
Northwest Area	Unknown[d]	12	12
Southwest Area - Western LW/SP	Unknown[d]	25	25
Southwest Area - Western Shallow Siltstone	Unknown[d]	33	33
Southwest Area - Southeast	Unknown[d]	43	43
Eastern Area	Unknown[d]	18	18
Inorganic Constituents[e]			
Northwest Area	Unknown[d]	56	20[b]
Southwest Area[f]	Unknown[d]	About 150 years +/- 50 years	About 60 years +/- 20 years
Eastern Area	NA[g]	NA[g]	NA[g]

[a]For natural attenuation modeling purposes, Alternatives No. 2 and 3 are assumed to have essentially the same impacts on groundwater.

[b]Alternatives No. 4A and 4B are the same except for inorganic constituents in the Northwest Area, where the time to MCLs in Alternative No. 4B would be less than 20 years.

[c]Using vinyl chloride in modeling.

[d]Contaminant levels would not reach MCLs until the landfill source is depleted (many decades). Once the source is gone, the time to reach MCLs would be similar to Alternative No. 2.

[e]Using antimony in modeling. Note that the inorganic modeling was fairly conservative and the times presented may be closer to upper-bound estimates.

[f]Inorganic model results were obtained from the southeast segment of the Southwest Area. These results are also assumed to be representative of inorganic transport in the other two segments in the Southwest Area. Note that uncertainty in the distribution of inorganic contamination and complexities in the groundwater flow conditions (especially over longer times and with greater distances from the landfill) leads to uncertainty in the simulation results, thus a range of years is shown for inorganic constituents in the Southwest Area.

[g]Inorganic constituent modeling not performed; primarily organic contamination in the area.

impracticable. None of the remedial alternatives include removal of the landfill contents, and all of the alternatives use a containment technology to prevent exposure to the contents.

Groundwater Contamination. For Alternatives No. 2, 3, and 4, it has been estimated that the magnitude of residual site-related risk in groundwater will be significantly reduced through perimeter liquids control; natural attenuation; and, for Alternative No. 4, control of groundwater beyond the landfill perimeter. Alternative No. 3 could slightly reduce the residual risk to groundwater over Alternative No. 2 by enhancing effectiveness of the perimeter liquids control system. The potential reduction is only considered slight, because the perimeter liquids control system would still inhibit migration of mobile contaminants to groundwater even if they were not actively extracted from the waste prism. Because the cleanup standards would be met in a shorter time-frame under Alternative No. 4, the risk reduction would be realized sooner. However, the eventual risk reduction would be the same for all three alternatives. In Alternative No. 1, the magnitude of site-related risk would initially increase because there would be additional influx of contaminants from the landfill to groundwater. Eventually, the site-related risk in groundwater would diminish in a similar fashion as the other alternatives; however, it is estimated that this would take many additional decades under Alternative No. 1.

Even with the site-related contaminants reduced to their cleanup standards, the estimated overall risks in groundwater could still exceed 10^{-4} because of naturally occurring levels of inorganic constituents, primarily arsenic, in the OII Site vicinity. However, Alternatives No. 2, 3, and 4 would reduce the site-related risks in an acceptable time frame (with the possible exception of the Southwest Area). Alternatives No. 2, 3, and 4 would be more protective of any future use of or exposure to groundwater in the OII Site vicinity, although there is no currently known use of this groundwater.

Leachate. Varying degrees of residual risk associated with leachate will remain at the landfill, depending on the alternative. Over the 30-year evaluation period, Alternative No. 3 would provide a slightly higher reduction in residual risk from leachate than the other three alternatives because an estimated 13 percent of the total leachate present in the landfill would be actively extracted. The reduction in residual risk would be only slightly higher than the other alternatives because a considerable volume of leachate (about 87 percent of the total) would remain onsite.

7.3.2 Adequacy and Reliability of Controls

This evaluation criterion pertains to the adequacy and suitability of controls that are used to manage treatment residuals or untreated wastes that remain at the site. The main controls used in the alternatives for the OII Site consist of containment or control systems and institutional controls.

Containment, Conveyance, and Treatment Technologies. The technologies included in Alternatives No. 1 through 4 (e.g., perimeter liquids control, leachate extraction, and groundwater extraction) are generally considered adequate and reliable, if properly designed, constructed, monitored, operated, and maintained.

Institutional Controls. All of the alternatives would rely on institutional controls to limit human exposure to potentially contaminated materials, prevent trespassing, and protect the integrity of the landfill closure and remedial action components within the landfill boundary. All of the alternatives would rely on groundwater monitoring and institutional controls to ensure that groundwater is not used until cleanup standards are met. (Again, no current groundwater use is known to occur in the landfill vicinity.) The adequacy and reliability of institutional controls are highly dependent on enforcement and maintenance by state and local regulators and adequate definition of the area of contamination over which institutional controls are required. Institutional controls can be subject to changes in the political jurisdiction, legal interpretations, and the level of enforcement, as well as to changes in the need for water resources. Institutional controls would only be effective with a high degree of certainty in the short term, because regulators of the institutional controls cannot ensure the effectiveness or enforceability beyond a number of years. Therefore, alternatives that rely on institutional controls for shorter time frames and smaller, well-defined areas are generally considered more reliable than those with long time frames and larger, less well-defined areas.

Duration of Institutional Controls. For institutional controls, the primary difference between the alternatives is the duration that the controls would be relied upon, the area over which they would be required, and the degree to which the area can be defined. Table 11 presents a comparison of the time to reach cleanup standards (after which time institutional controls are not necessary). Institutional controls would be required for the longest time in Alternative No. 1 (likely for many tens of years longer than Alternatives No. 2 and 3). For Alternatives No. 2 and 3, the maximum time required for institutional controls could be as high as 150 ±50 years (for inorganic contaminants in the Southwest Area). For Alternative No. 4, institutional controls would be required in the Southwest Area for up to about 60 +/- 20 years.

Area of Institutional Controls. Inorganic exceedances of cleanup standards define the area required for institutional controls, because inorganic constituents have migrated further than organic constituents in the OII Site vicinity. Simulation results used to estimate inorganic contaminant transport are summarized in the following paragraph. Inorganic transport simulation results are somewhat uncertain because of complex transport conditions at the OII Site that are difficult to model and because of uncertainties in the distribution of inorganic contamination.

For Alternative No. 4, groundwater with inorganic contaminants above cleanup standards would be contained at the approximate downgradient extent of currently known contamination. This would define the area requiring institutional controls for Alternative No. 4. In Alternatives No. 2 and 3, the inorganic constituents could potentially travel up to 600 feet (Northwest Area) or 1,000 +/- 500 feet (Southwest Area) further than the current extent of contamination. This maximum extent would define the area requiring institutional controls for Alternatives No. 2 and 3. In Alternative No. 1, inorganic constituents would not reach equilibrium and stop migrating until after the landfill source was depleted (likely to be many decades). After the landfill source is depleted, the time to reach cleanup standards would be similar to that presented for Alternative No. 2. Because the time until the source is depleted is unknown, the maximum extent of the area requiring institutional controls is not known and cannot be reliably projected. This would create significant challenges in administration of institutional controls under Alternative No. 1. For any of the alternatives, monitoring data could indicate that institutional controls would be required over a larger or smaller area than currently estimated.

Monitoring. All of the alternatives would rely on groundwater monitoring to varying degrees to ensure that institutional controls are adequate to prevent exposure and that engineering control systems are working properly. The OII Site is in a highly complex geologic environment. As a result, detecting contaminant migration may be difficult in some areas. Alternative No. 4 relies on groundwater monitoring the least. Alternatives No. 2 and 3 rely on monitoring considerably more than Alternative No. 4 because of the need to closely monitor the extent of contamination and the progress of natural attenuation. Alternative No. 1 relies on groundwater monitoring much more than the other alternatives for two reasons. First, the magnitude of additional releases from the landfill would need to be monitored to determine if offsite conditions were deteriorating significantly. Second, extensive offsite groundwater monitoring would be needed to determine how far that the uncontrolled groundwater contamination was migrating for implementation of institutional controls.

7.4 Reduction of Toxicity, Mobility, and Volume Through Treatment

This evaluation criterion addresses the statutory preference for selecting remedial actions that permanently and significantly reduce toxicity, mobility, or volume through treatment. This criterion is evaluated through treatment processes used and materials treated; the amount of hazardous materials destroyed or treated; expected reductions in the toxicity, mobility, and volume; irreversibility of the treatment; and the type and quantity of treatment residuals.

Because of uncertainties in the location, quantity, and flow characteristics of leachate within the landfill, it is not possible to estimate with certainty the total (or percentage) volume of leachate removed from the landfill for each of the alternatives. It is also not possible, primarily due to uncertainties in the distribution of groundwater contamination, to precisely evaluate the percentage of contaminants removed from the aquifer. However, based on estimated treatment plant influent flow rates and concentrations, quantities of constituents removed through collection/extraction can be estimated.

Table 12 presents the anticipated mass of organics and inorganics removed through collection/extraction of liquids in each alternative. Similarly, Table 13 presents the estimated mass of treatment residuals generated at the onsite treatment facilities. These numbers are adequate for comparative purposes, although they likely overestimate the total magnitude of mass removed and residuals generated over the 30-year period. EPA assumed, in estimating these mass values, that the quantity and quality of inflow to the treatment plant would remain constant over the 30-year treatment period. However, it is likely that the quantity of liquids and the influent concentrations would eventually decrease over time in the perimeter liquids control system (Alternatives No. 2, 3, and 4), interior leachate extraction wells (Alternatives No. 1 and 3), and groundwater extraction system (Alternative No. 4).

As shown in Table 12, Alternative No. 3 would remove significantly larger volumes of volatile organic compounds and semivolatile organic compounds (1.5 to 6 times more) than the other alternatives due to interior leachate extraction. Alternative No. 4B would remove the largest volume of inorganic constituents (2.7 to 11 times more than the other alternatives). If the option that incorporates Alternative No. 3 into Alternative No. 4 were considered, it would result in the largest volume of constituents removed (this option is not represented in Table 12).

Alternatives No. 2 and 4A with the sanitary sewer discharge option generate the least treatment residuals (Table 13). Alternatives No. 2 and 4A generate between 3.8 times less treatment residuals (than Alternative No. 1) and 10.3 times less treatment residuals (than Alternative No. 4B aquifer injection, irrigation, or surface water discharge options).

All of the alternatives would use the existing leachate treatment plant to treat landfill liquids to County Sanitation Districts of Los Angeles County discharge standards. The treatment processes would not remove all landfill liquid contaminants, as this is not required by the discharge standards. However, those constituents remaining in the treated water would be further treated at County Sanitation Districts of Los Angeles County sanitary sewer treatment facilities using an activated sludge process. This treatment would remove most of the organic and inorganic constituents. The treatment performed at both the onsite leachate treatment plant and the County Sanitation Districts of Los Angeles County sanitary sewer facilities would be irreversible.

7.5 Short-term Effectiveness

Several factors are addressed in evaluating short-term effectiveness of the remedial alternatives, including potential short-term risk to the community during implementation, threats to workers during remedial actions, and potential adverse environmental impacts from construction and implementation.

Table 12
Comparisons of Contaminants Removed Through Liquids Collection/Extraction
Reduction in Toxicity, Mobility, and Volume of Contaminants Through Treatment
OII Site Final Record of Decision

Alternative	Total Flow Rate (gpm)	Alternative-Specific Flow Rate (gpm)	Volatile and Semivolatile Organic Constituents		Total Organic Materials[a]		Total Inorganic Constituents[a]	
			Annual (tons/yr)	30-Year Total[b] (tons)	Annual (tons/yr)	30-Year Total[b] (tons)	Annual (tons/yr)	30-Year Total[b] (tons)
1	5.5	5.5	1.3	40	43	1,290	93	2,790
2	135	135	0.4	11	79	2,370	160	4,800
3[c]	155	20.5	4.6	63	230	4,780	620	11,450
4A[c]	501	366	0.4	12	81	2,430	350	10,500
4B[c]	755	620	0.5	16	82	2,460	1,030	30,900

[a] Organic (humic) materials removal was calculated based on the influent TOC. Inorganic constituent removal was calculated based on the estimated influent TDS (for Alternatives No. 2 and 4 an assumed baseline TDS of 500 mg/L was subtracted from the influent TDS in the calculation).

[b] Assumes that the estimated flow rates and influent concentrations remain constant throughout the 30-year period, except for Alternative No. 3 where the assumed flow rate decreases over time in the same manner as described for the costing (5 years at 20.5 gpm, 10 years at 10.25 gpm, and 15 years at 2 gpm).

[c] The Alternatives No. 3 and 4 annual and 30-year totals incorporate the Alternative No. 2 values.

Table 13
Comparisons of Treatment Residuals Generated[a]
Reduction in Toxicity, Mobility, and Volume of Contaminants Through Treatment
OII Site Final Record of Decision

Alternative	Total Flow Rate (gpm)	Alternative-Specific Flow Rate (gpm)	Waste Sludge		Waste Granular Activated Carbon	
			Annual (tons/yr)	30-Year Total[b] (tons)	Annual (tons/yr)	30-Year Total[b] (tons)
1	5.5	5.5	17	510	3.3	100
2	135	135	2.0	60	3.3	100
3[c]	155	20.5	72	880	9.5	200
4A - Sewer Discharge[c]	501	366	2.0	60	3.3	100
4A - Aquifer Discharge[c]	501	366	17	510	8.3	250
4A - Surface Water/Irrigation Discharge[c]	501	366	17	510	8.3	250
4B - Sewer Discharge[c]	755	620	15	450	13	390
4B - Aquifer Discharge[c]	755	620	42	1,260	13	400
4B - Surface Water/Irrigation Discharge[c]	755	620	42	1,260	13	400

[a] The treatment residuals generated are primarily from organic material.
[b] Assumes that the estimated flow rates and influent concentrations remain constant throughout the 30-year period, except for Alternative No. 3 where the assumed flow rate decreases over time in the same manner as described for the costing. (5 years at 20.5 gpm, 10 years at 10.25 gpm, and 15 years at 2 gpm).
[c] The Alternatives No. 3 and 4 annual and 30-year totals incorporate the Alternative No. 2 values.

Risk to Community During Remedial Action Implementation. Effects on the community during remedial actions are related to risks that result from implementation, such as dust during excavation or construction, increased vehicular traffic, air quality impacts from the release of gas, and noise.

Because there are no significant components to construct, Alternative No. 1 would have the fewest short-term, construction-related impacts. Installation of the perimeter liquids control system in Alternative No. 2 would slightly increase noise, dust, and vehicular traffic. Construction activities would primarily be onsite. Releases of landfill gas to the atmosphere could occur during excavation of the extraction trench but should not pose a risk to the community due to monitoring and implementation of mitigation measures to reduce emissions, as necessary. Effects to the community under Alternative No. 3 would be similar to, or slightly increased over, Alternative No. 2 because of installation of extraction wells within the waste prism.

Alternative No. 4 would present significantly greater impacts to the community because of the large-scale construction activities associated with installation of numerous extraction wells and conveyance systems throughout the surrounding neighborhoods. The greatest impacts would be in residential neighborhoods in the Southwest Area, where construction activities would occur in streets, sidewalks, and driveways. These activities are expected to cause significant increases in noise and dust from drilling and trenching operations, as well as significant disruptions to traffic flow patterns. There is also the potential for spills or leaks of contaminated groundwater in the neighborhoods under this alternative.

Protection of Workers During Remedial Action. There is a potential for adverse health effects on workers from exposure to hazardous substances during construction of any of the alternatives. If activities adhere to the site-specific health and safety plan and all regulatory requirements, this potential is minimized. Alternative No. 3 has a greater risk of exposure than the other alternatives because of the extensive installation of leachate extraction wells into the waste prism.

Construction-related accidents and injuries would likely increase in proportion to the amount of activities. As such, Alternative No. 4 has the most construction activities and thus would have the highest potential for accidents and injuries. Alternative No. 1 has the least construction of the alternatives and therefore would likely result in the fewest accidents and injuries. Alternatives No. 2 and 3 are fairly similar in the magnitude of construction, although Alternative No. 3 does add extraction wells and conveyance systems for interior leachate extraction. These two alternatives have significantly more construction than Alternative No. 1 and significantly less construction than Alternative No. 4.

Time Until Remedial Action Objectives Are Achieved. In general, the remedial action objectives relate to protection of human health and the environment by preventing exposure to landfill-related contaminants and preventing the release of landfill-related contaminants to the media of concern.

Short-term remedial action objectives for groundwater would be met when institutional controls, which reduce the potential for exposure, were activated.

Long-term (permanent) remedial action objectives for groundwater would be met when groundwater contaminant levels, through a combination of natural attenuation, perimeter liquids control, and control of groundwater beyond the landfill boundary (depending on the alternative), reach cleanup standards and institutional controls are no longer necessary. EPA used modeling of contaminant transport and the natural attenuation processes to estimate the approximate time to reach cleanup standards and the distance contamination would travel during that time. These results should be viewed only as tools for comparing and contrasting the relative merits of each alternative. In general, the modeling is somewhat conservative and likely gives values that are closer to upperbound estimates for times and distances (especially for inorganic constituents). Local variability in the landfill source or hydrogeologic parameters may result in contaminants actually reaching cleanup standards sooner or later and migrating shorter or longer distances than predicted by the model.

Table 11 shows the estimated times until cleanup standards are achieved based on the simulation results. As shown in the table, the time to reach cleanup standards in Alternative No. 1 is unknown. However, the time will likely be many decades longer than the times estimated for Alternatives No. 2, 3, or 4. There is a considerable reduction in the time to meet cleanup standards for inorganic constituents in groundwater in Alternative No. 4 (ranging from 20 to 60 +/- 20 years) compared to Alternatives No. 2 and 3 (ranging from 56 to 150 ±50 years). EPA's modeling indicates that there would be no difference in the time to meet cleanup standards among Alternatives No. 2, 3, and 4 for organic constituents.

Environmental Impacts. Potential environmental impacts associated with remedy implementation include releases of landfill gas to the air, soil erosion and silt buildup, and loss of wildlife habitat. Potential landfill gas releases and erosion and siltation impacts can be mitigated through proper placement of control measures and regular inspection during construction to maintain their effectiveness. Overall, all the alternatives are considered to have equal construction-related environmental impacts.

7.6 Implementability

This evaluation criterion addresses the technical feasibility, the availability of services and materials, and the administrative feasibility of each of the alternatives. The technical feasibility includes the ability to construct and operate the technology and the relative ease of undertaking the remedial action and the ability to monitor its effectiveness. The availability of services and materials addresses the availability of the necessary equipment, technologies, services, and other resources to construct the remedial action. The administrative feasibility considers the activities needed to coordinate and obtain approvals from other agencies.

Technical Feasibility. All of the alternatives are technically feasible and implementable. Fairly standard and proven construction techniques could be used to install the remedial components associated with the alternatives. The remedial measures could employ technologies, services, and materials that are proven, reliable, and generally available; no significant technical difficulties are anticipated for construction of the remedial components. The analysis of individual alternatives, described below, identifies some issues to be clarified.

Alternative No. 1 would be the easiest to implement because it requires the fewest construction and operational elements. Alternatives No. 2, 3, and 4 all include the installation of a perimeter liquids control system around portions of the landfill. Construction of an extraction trench and installation of extraction wells may be difficult because of existing belowgrade utilities, buried refuse along the trench alignment, and limited access between the landfill and the perimeter of the site. These difficulties may increase costs; however, the cost increase would be the same for all three alternatives.

Alternative No. 3 includes installation of extraction wells within the landfill. Some construction difficulties are anticipated, but wells are implementable. Landfill gas and leachate extraction wells have previously been installed into the landfill and pumped at the OII Site. It may be difficult to locate the extraction wells in the desired locations because of access difficulties. Because of the increased construction and operation issues associated with these wells, Alternative No. 3 is considered to be slightly less implementable than Alternative No. 2.

Alternatives No. 4A and 4B are considered the most difficult to implement, given the significant construction and operational requirements associated with the offsite extraction and conveyance systems. Construction in the residential areas adjacent to the landfill would require considerable more accommodation and coordination with local residents. Anticipated significant construction difficulties include access and availability of rights-of-way, presence of buried utilities, proximity to homes, and extensive disruption to the community.

Availability of Services and Materials. All alternatives could employ technologies that have proven reliable either at the OII Site or other sites. The equipment and personnel necessary to design and construct the alternatives are considered generally available for projects of this magnitude from a number of contractors, although some specialty contractors would likely be needed. All alternatives are considered approximately equal when considering the availability of services and materials.

Administrative Feasibility. All alternatives would require administrative effort, including implementation of institutional controls and coordination with other offices and agencies. Institutional controls are discussed above. In summary, institutional controls would be the most difficult to implement in Alternative No. 1 because the maximum extent of the inorganic contamination (and thus the area requiring institutional controls) is unknown, and the institutional controls would be required for the longest time. The institutional controls would be the easiest to implement in Alternative No. 4 because the area requiring institutional controls matches the current extent of contamination, and the controls would be needed for the shortest time. Institutional controls would be slightly more difficult to administer under Alternatives No. 2 and 3 than under Alternative No. 4.

Outside of institutional controls, Alternative No. 1 is considered the easiest to administratively implement. The existing leachate treatment plant already has a discharge permit, and the remaining permits or approvals are not anticipated to require significant coordination among the approval agencies.

Alternatives No. 2 and 3 would use the existing treatment plant to treat additional quantities of landfill liquids collected at the perimeter or from within the landfill. These alternatives also assume discharge to the sewer. A revision to the existing discharge permit would be needed to address the increased volume of liquids to be discharged.

Alternatives No. 4A and 4B would require the construction of extraction wells and conveyance systems in offsite areas. Gaining access and approval for the construction may prove problematic and cause significant delays. In the event voluntary access could not be acquired, access to the private properties would be sought through legal mechanisms, potentially a time-consuming and relatively unpredictable process. In addition, these alternatives would require extraction and discharge of significant amounts of groundwater. Acquisition of the necessary permits to pump and discharge the groundwater may be difficult. These activities would require considerable coordination with the Regional Water Quality Control Board and the water districts that oversee water rights. Because of these reasons, Alternatives No. 4A and 4B would be the most difficult to implement administratively.

7.7 Cost

A summary of estimated costs for the four alternatives is presented in Table 14. The table breaks down the capital, operation and maintenance, and net present worth cost estimates by costs common to all alternatives (interim operations and maintenance) and those costs that are alternative-specific. An overview of the cost analysis performed, as well as detailed cost breakdowns for each alternative, are presented in the Feasibility Study Report (EPA, 1996).

A cost component common to all alternatives is the interim operation and maintenance costs to operate the site for an estimated 5 years while the systems required by the Gas Control and Cover ROD and new systems required by this ROD are being implemented. This component totals $46,350,000. The Feasibility Study Report (EPA, 1996) provides additional detail on the derivation of this cost.

Table 14
Comparison of Costs
(in thousands)
OII Site Final Record of Decision

Alternative	Capital Cost	Annual O&M	Net Present Worth: Interim O&M	Net Present Worth: Capital Cost	Net Present Worth: Present Worth O&M	Net Present Worth: Total Net Present Worth
1	$ 2,800	$ 6,030	$ 46,350	$ 2,800	$ 92,700	$ 142,000
2	$ 17,600	$ 6,360	$ 46,350	$ 17,600	$ 97,800	$ 162,000
3	$ 25,500	$ 7,850	$ 46,350	$ 25,500	$ 120,700	$ 193,000
4A - Sewer Discharge	$ 30,100	$ 8,680	$ 46,350	$ 30,100	$ 133,400	$ 210,000
4A - Aquifer Discharge	$ 35,600	$ 10,360	$ 46,350	$ 35,600	$ 159,300	$ 241,000
4A - Surface Water Discharge	$ 35,000	$ 10,550	$ 46,350	$ 35,000	$ 162,200	$ 244,000
4A - Irrigation Discharge	$ 35,600	$ 10,590	$ 46,350	$ 35,600	$ 162,800	$ 245,000
4B - Sewer Discharge	$ 34,900	$ 9,510	$ 46,350	$ 34,900	$ 146,200	$ 227,000
4B - Aquifer Discharge	$ 46,200	$ 12,210	$ 46,350	$ 46,200	$ 187,700	$ 280,000
4B - Surface Water Discharge	$ 43,700	$ 12,190	$ 46,350	$ 43,700	$ 187,400	$ 277,000
4B - Irrigation Discharge	$ 44,300	$ 12,230	$ 46,350	$ 44,300	$ 188,000	$ 279,000

As shown in Table 14, the operation and maintenance costs are by far the largest portion of the estimated costs for each alternative. As would be expected, Alternative No. 4 has the highest alternative-specific capital cost, annual operation and maintenance costs, and net present worth costs. The estimated Alternative No. 4 net present worth costs range from $210 to $279 million, depending on the extraction and discharge option (Table 14). Alternative No. 1 has the lowest estimated total net present worth cost, $142 million. Alternative No. 2, at $162 million, costs an additional $20 million over Alternative No. 1. Alternative No. 3 costs an estimated $193 million, an additional $31 million over Alternative No. 2. As described throughout Section 7, significant additional benefits would be realized in choosing Alternative No. 2 over Alternative No. 1, at an additional cost of around $20 million (a 14 percent increase). On the other hand, substantial additional benefits are not apparent in choosing either Alternative No. 3 or 4 over Alternative No. 2, at an estimated increase in costs of between $31 and $119 million.

Certain components of the cost estimates may include overlap with costs associated with the Gas Control and Cover ROD. As implementation of both this remedy and landfill gas control and landfill cover systems progresses, there would likely be opportunities to realize cost savings over the estimates presented herein, particularly if the same entity is implementing both components and the design and implementation of both is occurring concurrently.

7.8 State Acceptance

In a letter dated September 6, 1996, the State of California (Cal-EPA Department of Toxic Substances Control) concurred with EPA's selected remedy for the OII Site.

7.9 Community Acceptance

EPA received 10 sets of comments from individuals, organizations, and agencies on EPA's Remedial Investigation, Feasibility Study, and Proposed Plan for this remedy at the OII Site. These comments, and EPA's responses to the comments, are presented in the Responsiveness Summary in Part II of this ROD.

Some of the comments received from the community expressed support for EPA's proposed remedy; others did not. Several of the commentors recommended that EPA select remedial Alternative No. 3. EPA has determined that the preferred alternative presented in the Proposed Plan (Alternative No. 2) is the most appropriate remedy and provides responses to those commentors that preferred other alternatives in the attached Responsiveness Summary.

8.0 Selected Remedy

After considering CERCLA's statutory requirements, the detailed comparison of the alternatives using the nine criteria, and public comments, EPA, in consultation with the State of California, has determined that the most appropriate remedy for the OII Site is Alternative No. 2: Perimeter Liquids Control. The selected remedy addresses liquids control and contaminated groundwater as well as long-term operation and maintenance of environmental control facilities at the landfill. Liquids will be controlled at the landfill perimeter to prevent migration of contaminants to groundwater. Contaminated groundwater currently beyond the landfill perimeter will be allowed to naturally attenuate over time. This remedy meets the two Superfund threshold evaluating criteria, overall protection of human health and the environment and compliance with ARARs, and provides the best balance of the remaining Superfund evaluation criteria. The major components of the selected remedy for this action include:

- Installation of a perimeter liquids control system in areas where contaminants are migrating from the landfill at levels that cause groundwater to exceed performance standards. Contaminated groundwater currently beyond the landfill perimeter would be reduced to below cleanup standards through natural attenuation.

- Conveyance of the collected liquids to the existing onsite treatment plant.

- Onsite treatment of collected liquids using the existing leachate treatment plant, modified as necessary, to handle the new liquids. Discharge of treated liquids to the County Sanitation Districts of Los Angeles County sanitary sewer system.

- Implementation of a monitoring and evaluation program to ensure that natural attenuation of the contaminated groundwater is progressing as anticipated, to ensure that perimeter liquids control system performance standards are being met, and to detect future releases of contaminants from the landfill.

- Establishment of institutional controls to ensure appropriate future use of the OII Site and to restrict groundwater use in the immediate vicinity of the OII Site. The institutional controls will supplement the engineering controls to prevent or limit exposure to hazardous substances.

- Interim operation and maintenance of existing site activities (gas extraction and air dike, leachate collection, leachate treatment, irrigation, access roads, stormwater drainage, site security, slope repair, and erosion control), except to the extent that they are addressed under the Gas Control and Cover ROD.

- Long-term operation and maintenance of all facilities and environmental control components at the OII Site, excluding those covered under the Gas Control and Cover ROD.

Figure 18 shows some of the conceptual components of the selected remedy.

These measures are in addition to EPA's previous decision to build and operate a landfill gas migration control system, landfill cover, and surface water management system, as outlined in the Gas Control and Cover ROD. These components are not reselected or modified in this ROD, and remedial design of these systems is already underway. The selected remedy, in conjunction with the Gas Control and Cover ROD, addresses all contaminated media at the OII Site.

EPA will review the selected remedy no less often than every 5 years after the initiation of the remedial action to ensure that human health and the environment are being protected by the implemented remedy. As part of the review, EPA will evaluate whether the performance standards specified in this ROD remain protective of human health and the environment. EPA will continue reviews until no hazardous substances, pollutants, or contaminants remain at the OII Site above levels of concern for human health and the environment.

The following sections describe the remedial objectives and performance standards for the various components of the selected remedy. Using performance standards, rather than specifying particular technologies or actions, allows for more flexibility during remedial design and remedial action. This approach can be much more efficient and cost-effective in instances where uncertain or variable conditions are present, such as the subsurface conditions around portions of the OII Site.

8.1 Perimeter Liquids Control Component

The remedial action objective of the perimeter liquids control component of the selected remedy is to prevent migration of contaminants from the landfill to groundwater at levels that impair water quality and/or represent a potential threat to human health and the environment. The technologies necessary to achieve this objective and comply with the performance standards described below will be selected during remedial design.

8.1.1 Performance Standards and Point of Compliance

Perimeter liquids control will be required in areas where contaminants migrate from the landfill at levels causing groundwater to exceed chemical performance standards. The chemical performance standards for perimeter liquids control for each contaminant of concern are shown in Table 15. The list of contaminants of concern presented in Table 15 has been selected from the list of chemicals of potential concern from the Baseline Risk Assessment (Table 3), based on additional evaluation of groundwater monitoring data. These standards have been set based on ARARs (state or federal drinking water MCLs, to the extent that they are above baseline), as available. If an MCL is not currently available for a specific contaminant of concern, health-based criteria have been used for the performance standards. Compound-specific health-based criteria are based on either a cancer risk of 1×10^{-6} or a noncancer hazard index of 1.

There are several segments around the landfill perimeter where available groundwater monitoring data indicate that performance standards are being exceeded. These areas include:

- Along the northwestern perimeter of the South Parcel in the vicinity of Well CDD-13, to a depth of approximately 70 feet
- Along the northwestern perimeter of the South Parcel in the vicinity of Well OI-24B, at a depth of approximately 130 to 150 feet
- Along the northwestern perimeter of the South Parcel in the vicinity of Wells OI-19A and OI-19C, to a depth of approximately 180 feet
- Along the northeastern perimeter of the South Parcel in the vicinity of Well OI-20A, to a depth of approximately 170 feet
- Along the western perimeter of the South Parcel between Wells PE-3 and PE-7, to a depth of approximately 200 feet
- Along the western perimeter of the South Parcel in the West Aquifer in the vicinity of Well OI-18B, at a depth of approximately 280 to 300 feet
- At the southwestern corner of the South Parcel between Wells OI-53P and OI-50A to a depth of approximately 80 feet
- Along the southern boundary of the South Parcel between Wells OI-16A and PE-13 to a depth of approximately 175 feet

Perimeter liquids control is required in each area where groundwater exceedances of performance standards have been confirmed or are confirmed in the future. At a minimum, perimeter liquids control is required in the aforementioned areas. The remedial design

Table 15
Perimeter Liquids Control Chemical Performance Standards and Groundwater Cleanup Standards
OII Site Final Record of Decision

Contaminant of Concern	State or Federal ARAR[d] (ug/L)	Health-Based Concentration (ug/L)	Selected Performance Standard and Cleanup Standard (ug/L)
ORGANICS			
1,1,1-Trichloroethane	200	1,473	200
1,1,2-Trichloroethane	5	0.32	5
1,1-Dichloroethane	5	1,000	5
1,1-Dichloroethylene	6	0.07	6
1,2,4-Trichlorobenzene	70	23	70
1,2-Dichlorobenzene	600	464	600
1,2-Dichloroethane	0.5	0.2	0.5
1,2-Dichloroethylene, cis-	6	77	6
1,2-Dichloroethylene, trans-	10	153	10
1,2-Dichloropropane	5	0.26	5
1,3-Dichloropropene, cis-	0.5	0.13	0.5
1,3-Dichloropropene, trans-	0.5	0.13	0.5
1,4-Dichlorobenzene	5	0.72	5
1,4-Dioxane		1.6	1.6
2-Butanone		2,464	2,464
4-Methyl-2-pentanone		198	198
Acetone		768	768
Aldrin		0.0005	0.0005[a]
Benzene	1	57.89	1
BHC, beta-		0.05	0.05
BHC, gamma- (Lindane)	0.2	0.06	0.2
bis(2-Ethylhexyl)phthalate	4	5.6	4
Butylbenzylphthalate	100	6,034	100
Carbon tetrachloride	0.5	0.25	0.5
Chlordane	0.1	0.06	0.1
Chlorobenzene	70	51	70
Chloroform	100	0.27	100
Di-n-octylphthalate		9.3	9.3
Dibromochloromethane	100	1.0	100
Endrin	2	10	2
Ethylbenzene	700	704	700
Heptachlor	0.01	0.02	0.01
Heptachlor epoxide	0.01	0.01	0.01
Methoxychlor	40	162	40
Methylene chloride	5	6.2	5
Pentachlorophenol	1		1
Styrene	100	0.01	100
Tetrachloroethylene	5	0.74	5
Toluene	150	683	150
Trichloroethylene	5	2.1	5
Trichlorofluoromethane	150	1,641	150
Vinyl chloride	0.5	0.03	0.5
Xylenes, total	1,750	1,885	1,750
INORGANICS			
Aluminum	1,000	36,500	1,000
Ammonia		35,405	35,405

Table 15
Perimeter Liquids Control Chemical Performance Standards and Groundwater Cleanup Standards
Oll Site Final Record of Decision

	State or Federal ARAR[d]	Health-Based Concentration	Selected Performance Standard and Cleanup Standard
Antimony	6	15	6
Arsenic	50	0.05	50
Barium	1,000	2,555	1,000
Beryllium	4	0.02	4
Cadmium	5	18	5
Chromium VI	50	183	50
Chromium III	50	36,500	50
Copper	1,300	1,351	1,300
Cyanide	200	730	200
Fluoride	1,990[b]	2,190	1,990[b]
Lead	15		15
Manganese		1830[c]	1830[c]
Mercury	2	11	2
Nickel	100	730	100
Nitrate (As NO_3)	10,000	58,400	10,000
Nitrite (as N)	1,000	3,650	1,000
Selenium	50	183	50
Thallium	4[b]		4[b]
Vanadium		256	256
Zinc		10,950	10,950

[a]Present analytical techniques are limited to 0.05 ug/l. This value may need to be adjusted in the future if analytical techniques do not improve.
[b]These values are baseline concentrations as presented in the Draft Remedial Investigation Report (EPA, 1994c). These baseline concentrations are higher than their respective MCLs. Therefore, in accordance with Title 22, CCR, Section 66264.94, the baseline concentrations are used.
[c]This value has been adjusted from the one presented in the Risk Assessment appendix (Appendix B) of the Feasibility Study Report (EPA, 1996) because of newer reference dose data.
[d]The most stringent of either the state or Federal MCL is listed.

investigation must be sufficient to identify any additional areas where groundwater exceeds performance standards.

In accordance with the ARARs (presented in Section 9), the point of compliance is at the downgradient boundary of the waste management unit. The monitoring points to be used to determine compliance shall be identified during remedial design. Hydraulic control, or potentially other measures acceptable to EPA, must be used to demonstrate that the perimeter liquids control system is complying with the remedial action objective. In areas that do not have groundwater contaminant concentrations in excess of the chemical performance standards, compliance will be demonstrated by continued detection monitoring to ensure that future releases resulting in groundwater concentrations above the chemical performance standards do not occur.

The perimeter liquids control system will need to operate until releases are no longer occurring that cause groundwater concentrations in exceedance of chemical performance standards or, if the perimeter control system uses hydraulic control, until liquids are no longer present in the perimeter liquids control system. If portions of the perimeter liquids control system meet these requirements, those portions could be shut down while other portions continue to operate.

8.1.2 Contingency Measures

If the perimeter liquids control system is not demonstrated to be effective, appropriate measures shall be taken to bring the system into compliance. Examples of such measure may include, but are not limited to, any of the following, subject to approval by EPA: more closely spaced extraction wells to facilitate perimeter liquids control, higher extraction rates to increase hydraulic control, installation of a cutoff well or extraction trench in place of wells, or extraction from inside the waste prism to enhance control. EPA may also determine that more extensive groundwater monitoring is required to ensure that concentrations in groundwater are not increasing.

8.2 Liquids Treatment Component

The existing leachate treatment plant, modified as necessary, shall be used to treat the liquids collected as part of the selected remedy. The treated liquids shall be discharged to County Sanitation Districts of Los Angeles County sanitary sewer system. Based on existing monitoring data collected from the landfill perimeter and the existing industrial wastewater discharge permit issued by County Sanitation Districts of Los Angeles County (CSDLAC, 1994), only minor modifications to the treatment plant would be required. In addition, mitigation measures shall be designed to improve treatment plant aesthetics. However, because the selected remedy will result in increased discharge volumes, the existing permit will need to be modified. If County Sanitation Districts of Los Angeles County changes the wastewater discharge requirements, more extensive treatment plant modifications may be necessary.

Off-gas or air emissions from the treatment plant shall be conveyed through the existing or a modified foul-air system to the existing flare or the thermal destruction facility (to be constructed under the Gas Control and Cover ROD) for treatment.

8.2.1 Performance Standards and Point of Compliance

The performance standards for effluent from the treatment plant shall be the discharge requirements outlined in the existing discharge permit (Table 16). If County Sanitation Districts of Los Angeles County revises the discharge limits, the new discharge limits shall supersede the performance standards listed in Table 16.

County Sanitation Districts of Los Angeles County shall determine the point of compliance as part of the industrial wastewater discharge permit. Currently, all effluent from the treatment plant is held for batch discharge following testing; the point of compliance is the effluent discharge tank. If continuous discharge is allowed in the revised permit, the point of compliance will likely be the discharge weir.

8.2.2 Contingency Measures

If performance standards cannot be met by the existing plant, additional treatment processes shall be installed, as necessary, to ensure compliance with the performance standards.

8.3 Groundwater

The remedial action objectives for groundwater cleanup under the selected remedy are to reduce contaminant concentrations in groundwater to below cleanup standards through perimeter liquids control and natural attenuation and to prevent exposure to contaminated groundwater through implementation of institutional controls. Institutional controls are discussed below in Section 8.5.1. EPA believes that perimeter liquids control and natural attenuation will be sufficient to reduce concentrations to cleanup standards. However, if that is not the case, EPA will implement contingency measures (described below).

8.3.1 Performance Standards and Point of Compliance

The key element of the groundwater component of the selected remedy is the ability of the groundwater contamination to naturally attenuate. As part of the Feasibility Study, EPA used

Table 16
Effluent Discharge Limits
OII Site Final Record of Decision

Conventional Pollutants	Discharge Limit (mg/L)
pH	>6 pH units
Dissolved Sulfides	0.1
Temperature	140°F
Heavy Metals and Cyanide (Total)	
Arsenic	3
Cadmium	0.69
Chromium	2.77
Copper	3.38
Lead	0.69
Mercury	2
Nickel	3.98
Silver	0.43
Zinc	2.61
Cyanide	1.20
Priority Organics (Total)	
Oil and Grease (per Method 5520B)	75
Volatile Total Toxic Organics	1.0
Semivolatile Total Toxic Organics	1.0
Total Identifiable Chlorinated Hydrocarbons (TICH)[a]	Essentially None
Radioactivity	
[Title 17, CCR, Section 30287: Concentration of any radionuclide: 400 picoCuries per liter above background; Total: 1 curie per year.	
[a]TICH are comprised of: aldrin, dieldrin, chlordane (cis & trans), trans-nonarochlor, oxychlordane, heptachlor, and heptachlor epoxide, DDT and derivatives (p, p', and o, p' isomers of DDT, DDD and DDE), endrin, HCH (sum of a, b, g, d, isomers of hexachlorocyclohexane), toxaphene, polychlorinated biphenyls.	

an analytical model to evaluate the effect of natural attenuation on reducing groundwater contaminant concentrations. Although the numbers generated by the model are not expected to be extremely precise, they do provide a rough guideline with which to evaluate the progress of natural attenuation. Thus, the performance standard for the groundwater component of the selected remedy is for contaminant concentrations in groundwater to be reduced to below the cleanup standards (Table 15) through natural attenuation in accordance with the approximate times and distances provided in Table 17.

Table 17 provides estimates of approximate natural attenuation times and migration distances for both organic and inorganic constituents in different areas and units around the OII Site. Table 17 indicates areas that were not specifically modeled by EPA; the values presented are extrapolated from other areas that were modeled. In these cases, additional evaluation during remedial design may be warranted. Additional definition of some of the groundwater plumes may also be necessary during remedial design.

In accordance with the ARARs (presented in Section 9), the point of compliance is at the downgradient boundary of the waste management unit. EPA shall identify the monitoring points to be used to determine compliance during remedial design. Groundwater cleanup standards identified in Table 15 shall be attained in groundwater at the point of compliance.

Groundwater monitoring and evaluation shall be performed to determine if natural attenuation is progressing approximately as predicted. The specifics of the monitoring and evaluation program will be determined during remedial design; at a minimum, this program shall include procedures for well-by-well and plumewide evaluation, as described below.

For groundwater that is currently contaminated above cleanup standards, statistical methods shall be used to evaluate monitoring data on both a well-by-well basis and a plumewide basis. If the well-by-well analysis indicates significantly increasing concentrations, additional evaluation will be required and additional monitoring may be necessary in the vicinity of the well.

The plumewide analysis will be compared to the times and distances provided in Table 17 to ensure that concentrations in the overall plume are reducing as expected and that higher-than-expected downgradient contaminant migration is not occurring. If either of these criteria are not met, more detailed evaluation will be required and contingency measures shall be implemented, if EPA determines that they are necessary. General contingency measures are discussed below.

Any concentration increases in groundwater downgradient of existing contamination should not exceed the time and distance expectations listed in Table 17. Increases that are not in accordance with Table 17 will warrant additional evaluation. Contingency measures shall be implemented if EPA determines that they are necessary.

Table 17
Approximate Time and Migration Distances to Reach Cleanup Standards in Groundwater Under the Selected Remedy
OII Site Final Record of Decision

Area	Organic Constituents[a]		Inorganic Constituents[a]	
	Years	Distance (feet)	Years	Distance (feet)
Northwest Area - Shallow Units	12	0	56	600
Northwest Area - Deeper Units	12[b]	0	56[b]	600
Southwest Area - Shallow Units	34 (average[c])	200	About 150 years +/- 50 years[d]	About 1,000 feet +/- 500 feet[d]
Southwest Area - West Aquifer	34[b]	200	Not Applicable	Not Applicable
Eastern Area	18	0	56[b]	600[b]

[a]These approximate times and distances should be considered as general guidelines for evaluating the progress of natural attenuation and should not be considered as precise time frames for remediation, additional evaluation during remedial design may be warranted. The distances listed refer to distances beyond the current areas of contamination (shown in Figure 20).

[b]Modeling of natural attenuation was not performed specifically for this area; estimated times are extrapolated from other areas. Additional evaluation may be warranted during remedial design in these areas.

[c]Simulations were performed in different portions of the Southwest Area and 34 years represents the average of these simulations.

[d]Note that uncertainty in the distribution of inorganic contamination and complex groundwater flow conditions (especially over longer times and with greater distances from the landfill) leads to uncertainty in the simulation results, thus a range of years and distances is shown for inorganic constituents in the Southwest Area.

For groundwater that is currently not contaminated and not immediately downgradient of existing contamination, cleanup standards should not be exceeded. Confirmed exceedances of cleanup standards in such areas will warrant additional evaluation. Contingency measures shall be implemented if EPA determines that they are necessary.

8.3.2 Contingency Measures

If, during implementation of the selected remedy, it is demonstrated that natural attenuation is not progressing as expected or additional exceedances of cleanup standards are confirmed in previously clean areas, appropriate actions will be required to meet the performance standards. Examples of contingency measures include, but are not limited to, the following, subject to approval by EPA:

- Additional groundwater monitoring to evaluate the significance of further migration
- Enhanced perimeter liquids control in the area(s) of concern
- Expanded institutional controls over a larger area
- Active groundwater remediation measures (e.g., focused groundwater pumping)

If contingency measures represent a significant departure from the selected remedy, a ROD amendment or Explanation of Significant Differences may be appropriate.

8.4 Environmental Monitoring

To ensure that the performance standards are met for all components of the selected remedy for as long as contamination remains onsite, a long-term monitoring program shall be designed and implemented. The monitoring program is intended to meet several objectives, including:

- Assess compliance with the chemical performance standards and cleanup standards
- Monitor the effectiveness of the perimeter liquids control system
- Detect additional releases of contaminants from the landfill
- Monitor the progress of natural attenuation in groundwater
- Monitor effluent chemical concentrations from the treatment plant

Details of the monitoring program shall be described in a monitoring plan to be submitted for EPA approval during remedial design. Additional information on various components of the monitoring program is included above in Sections 8.1 and 8.3, as well as in the following sections.

8.4.1 Detection Monitoring

As described in the ARARs section below (Section 9), a detection monitoring program shall be applied to areas at the landfill perimeter that are currently unaffected by releases. A monitoring plan shall be developed that outlines the list of parameters to be monitored (this list shall, at a minimum, include the contaminants of concern presented in Table 15), and the frequencies for collecting samples and conducting statistical analyses. Sampling shall be scheduled to include the times of expected highest and lowest elevation of the potentiometric surface. The list of parameters shall be selected to provide reliable indication of a release from the landfill.

Perimeter liquids control will be necessary in any area in which groundwater concentrations exceed chemical performance standards. Detection monitoring can be re-established after perimeter liquids control is no longer necessary in that area. Detection monitoring shall continue until the groundwater has been in continuous compliance with the chemical performance standards for a period of 3 consecutive years.

8.4.2 Compliance/Performance Monitoring

Four types of compliance or performance monitoring will be needed as part of the selected remedy. For the perimeter liquids control system, the types of monitoring include:

- Monitoring contaminant concentrations downgradient of the perimeter liquids control system to determine compliance
- Monitoring physical conditions downgradient of the perimeter liquids control system to determine compliance

For natural attenuation, the types of monitoring include:

- Monitoring of the groundwater contamination to evaluate the progress of natural attenuation (as described above in Section 8.3.1)
- Monitoring downgradient of the existing areas of groundwater contamination to ensure that contaminants are not moving at faster rates than predicted (see Section 8.3.1).

A monitoring plan shall be prepared that outlines how each of these types of compliance monitoring will be performed. The monitoring plan shall comply with the ARARs identified in Section 9.3. The monitoring plan shall detail the locations of the monitoring, the frequency of the monitoring, the constituents to be monitored, the types of statistical evaluations to be performed, and how the monitoring and evaluation results will be used to determine compliance with performance standards.

8.5 Additional Components

This section describes additional components of the selected remedy, including institutional controls, site administration, site security, and operation and maintenance of facilities and environmental control systems.

8.5.1 Institutional Controls

Institutional controls are nonengineering methods that federal, state, local governments, or private parties can use to prevent or limit exposure to hazardous substances, pollutants, or contaminants, to ensure the effectiveness of remedial actions. The selected remedy requires institutional controls both on the landfill and in certain areas beyond the landfill boundary.

Institutional Controls Within the Landfill Boundary. The primary objectives of institutional controls within the landfill boundary are to (1) limit human exposure to potentially contaminated materials, (2) prevent trespassing, and (3) protect the integrity of the landfill closure and remedial action components. Institutional controls within the landfill boundary may include, but are not limited to, deed notices and restrictions on construction that run with the land; access restrictions including, but not limited to, fencing and warning signs; zoning controls; and well restrictions. Institutional controls within the landfill boundary must prohibit all activities and uses that EPA determines would interfere or be incompatible with, or that would in any way reduce or impair the effectiveness or protectiveness of this remedy. Institutional controls shall also be required for site-related facilities outside of the landfill boundary.

Institutional Controls Beyond the Landfill Boundary. Institutional controls must also be implemented to prevent use of contaminated groundwater as a drinking water supply for the duration of the remedy. Institutional controls are required in areas where contaminant concentrations exceed the chemical performance standards or where they are anticipated to exceed performance standards in the future. The exact area where institutional controls will need to be implemented shall be determined during remedial design, as approved by EPA. There are currently no known groundwater wells in use within the areas of groundwater contamination; all residences, businesses, and industrial facilities within the expected area of institutional controls are currently connected to municipal water systems.

Implementation of institutional controls will need to be coordinated with the local Watermasters in the San Gabriel and Central Basins to conform with existing regulations governing groundwater use in both groundwater basins in the OII Site vicinity as both basins are adjudicated. The strict control on groundwater use should help to implement institutional controls. Coordination with Los Angeles County, which requires permits for well installation, shall also be required. If deemed necessary, local ordinances may also be used to limit installation of drinking water wells.

North Parcel Areas Not Used as a Landfill or for Site-Related Facilities. EPA determined that no landfill-related risks are posed by soils in the areas of the North Parcel not containing landfill-related wastes, nor used for site-related facilities (the "nonlandfill areas"). Therefore, no further action is required for soils in the nonlandfill areas. The Baseline Risk Assessment (presented as Appendix B in EPA, 1996) did identify potential risks associated with nonlandfill-related businesses present on the North Parcel and/or with the adjacent Pomona Freeway. State and local authorities may wish to consider such potential risks when evaluating appropriate use of the nonlandfill areas. Institutional controls and, potentially, engineering controls will be required for contaminated groundwater and, potentially, liquids control on the North Parcel.

8.5.2 Site Administration

The selected remedy incorporates long-term administration of site activities, including management of staff, ordering equipment, and performing other administrative functions to ensure that performance objectives are met. Specific activities shall be determined during remedial design.

8.5.3 Operation and Maintenance of Facilities and Environmental Control Systems

The selected remedy includes operation and maintenance of all facilities and environmental control systems at the OII Site, except for those systems covered by the Gas Control and Cover ROD. These activities, facilities, and environmental control systems include: the perimeter liquids control system, groundwater monitoring system, leachate treatment plant, leachate collection system, gas extraction and air dike system, irrigation system, access roads, stormwater drainage system, site security, slope repair, erosion control, and site operation facilities, except to the extent that these activities, facilities, and systems are addressed by the Gas Control and Cover ROD.

In accordance with ARARs (as presented in Section 9), the existing leachate collection system (or equivalent) will need to be operated until leachate is no longer generated and detected or until it is no longer feasible to operate.

8.6 Cost of the Selected Remedy

The selected remedy was evaluated for cost in terms of capital costs, annual or operation and maintenance, and net present worth cost. Capital costs include the sum of direct capital costs (such as construction materials and labor, equipment, sewer connection fees) and indirect capital costs (such as engineering, legal, construction management). Annual costs include the cost for labor, materials, maintenance, energy, and equipment replacement. Net present worth costs include capital costs plus operation and maintenance costs over a 30-year period. Table 18 summarizes the capital, annual operation and maintenance, and net present worth costs for the selected remedy.

A cost component common to all alternatives is the interim operation and maintenance costs to operate the site for an estimated 5 years while the systems required by the Gas Control and Cover ROD and new systems required by this ROD are being implemented. This component totals $46,350,000. The Feasibility Study Report (EPA, 1996) provides additional detail on the derivation of this cost.

9.0 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), requires remedial actions on CERCLA sites to attain (or justify the waiver of) applicable, or relevant and appropriate, federal and state environmental or state facility siting requirements. These applicable, or relevant and appropriate, requirements are referred to as "ARARs." Federal ARARs may include requirements promulgated under any federal environmental laws. State ARARs may only include promulgated, enforceable environmental or facility-siting laws of general application that are more stringent or broader in scope than federal ARARs and that are identified by the state in a timely manner. The California Department of Toxic Substances Control, the lead state agency for the OII Site, provided potential State ARARs to the EPA as part of this process.

Applicable requirements are those cleanup standards, standards of control, criteria, or limitations that specifically address conditions, circumstances, or activities at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control, criteria, or limitations that, while not directly "applicable" to conditions, circumstances, or activities at a CERCLA site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the site. A requirement that is not directly applicable must be both relevant and appropriate, based on site-specific factors, to be an ARAR. The criteria for determining relevance and appropriateness are listed in the NCP, 40 CFR § 300.400(g)(2).

Table 18 Selected Remedy Cost Estimate Summary OII Site Final Record of Decision	
DESCRIPTION	**Total Cost**
CAPITAL COSTS:	
Administration, Institutional Controls, Site Security, and Facility Maintenance:	$953,000
Perimeter Control System	$6,089,000
Landfill Liquids Treatment Capital Costs	$496,000
Sewer Connection Fees	$301,000
Postconstruction Environmental Monitoring	$435,000
Subtotal	$8,274,000
Bid and Scope Contingencies @ 30%	$2,480,000
TOTAL DIRECT COST	$10,754,000
Indirect Costs @ 38.5%	$4,160,000
Alternative No. 2 Remedial Design Investigation	$2,679,000
TOTAL INDIRECT COST	$6,840,000
TOTAL CAPITAL COST	$17,590,000
ANNUAL O & M	
Administration, Inst. Controls, Site Security, and Fac. Maint.	$2,712,000
Perimeter Control System Maintenance	$720,000
Landfill Liquids Treatment Operation and Maintenance	$802,000
Postconstruction Environmental Monitoring	$656,000
Subtotal	$4,890,000
Contingencies @ 30%	$1,470,000
TOTAL ANNUAL O & M	$6,360,000
Capital Costs	$17,600,000
Present Worth of O&M (30 yrs @ 5%)	$97,800,000
Site Operations During Remedy Implementation (5 years assumed)	$46,350,000
TOTAL SELECTED REMEDY NET PRESENT VALUE	**$161,800,000**

Nonpromulgated advisories or guidance issued by federal or state government do not have the status of potential ARARs. Such advisories or guidance, which are termed "To-be-Considered Material," may be used during the cleanup process to further the goal of protecting human health and the environment.

ARARs only include substantive, not administrative, requirements, and pertain only to on-site matters. Any offsite activities must comply with all applicable federal, state, and local laws, including both substantive and administrative requirements.

ARARs are identified on a site-specific basis from information about the chemicals at the site, the actions that may take place at the site, and the features of the site location. There are three general categories of ARARs:

- Chemical-specific ARARs are numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values. They are used to determine acceptable concentrations of specific hazardous substances, pollutants, and contaminants in the environment. If a chemical is subject to more than one numerical value or methodology, the most stringent is generally selected.
- Location-specific ARARs are restrictions placed on the concentration of hazardous substances, pollutants, or contaminants or the conduct of activities solely because they are in specific locations, such as wetlands or floodplains.
- Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous substances, pollutants, or contaminants.

EPA's analysis and identification of chemical-specific, location-specific, and action-specific ARARs for the selected remedy for the OII Site followed EPA guidance, including the CERCLA Compliance with Other Laws Manual (Interim Final), EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9234.1-01, August 1988 (EPA, 1988k), and the CERCLA Compliance with Other Laws Manual: Part II, Clean Air Act and Other Environmental Statues and State Requirements (Interim Final), OSWER Directive 9234.1-02, August 1989 (EPA, 1989f).

The following sections present the federal and state ARARs identified for this remedy. Federal and state chemical-specific ARARs are discussed in Section 9.1, and are listed in Table 19. Federal and state location-specific ARARs are discussed below in Section 9.2, and are listed in Table 20. Federal and state action-specific ARARs are discussed below in Section 9.3, and are listed in Table 21.

Table 19
Summary of Chemical-Specific ARARs
OII Site Final Record of Decision

Citation	Description of Requirement	ARAR Determination	Comments
FEDERAL ARARs			
40 CFR § 141, Subparts B and G	Establishes national primary drinking water standards for public drinking water supply systems (Maximum Contaminant Levels, or "MCLs").	Relevant and appropriate	MCLs are relevant and appropriate for groundwater designated as a current or potential source of drinking water where the more stringent maximum contaminant level goals ("MCLGs") are not relevant or appropriate. MCLGs are not appropriate due to the complex hydrogeological setting at the OII Site, the minimal risks of exposure, and the limited potential use of the resource. MCLs for contaminants of concern are listed in Table 15.
22 CCR § 66264.94 (c)	Requires establishment of groundwater protection standards for waste management units where releases have occurred; concentration limits may be set greater than background (up to the MCL) if it is technically or economically infeasible to achieve background and the proposed limit will not pose a substantial hazard to human health or the environment.	Applicable	EPA selected MCLs that exceed baseline (or health-based limits where no MCLs are set) as the groundwater protection standard, due to the complex hydrogeological setting at the OII Site, the minimal risks of exposure, and the limited potential use of the resource. The groundwater protection standards are listed in Table 15. This requirement is applicable (by reference from 22 CCR § 66265.99) to interim status facilities at which groundwater remediation is necessary.
STATE ARARs			
22 CCR §§ 64431, 64444	Establishes California primary drinking water standards for public drinking water supply systems (also known as "MCLs").	Relevant and appropriate where more stringent than federal standard	Specific California MCLs are relevant and appropriate where they are more stringent than federal MCLs. California MCLs that are more stringent than federal MCLs for contaminants of concern are listed in Table 15.
State Water Resources Control Board Resolution 92-49 III. G	Requires cleanup and abatement of discharges to background water quality, or the best water quality which is reasonable if background levels cannot be restored.	Applicable	Applicable to wastes discharged to waters of the state. EPA selected MCLs that exceed baseline (or health-based limits where no MCLs are set) as the groundwater protection standard, due to the complex hydrogeological setting at the OII Site, the minimal risks of exposure, and the limited potential use of the resource.
Porter-Cologne Water Quality Control Act § 13370.5; California Government Code § 54739	Pursuant to these authorities, the Los Angeles County Sanitation District issues Industrial Wastewater Discharge permits setting discharge limits for concentration of contaminants, temperature, and volume.	Off-site discharge requirement	Permits are required for discharges to the sanitary sewer, because it is an off-site activity. Discharges must meet pretreatment standards, presented in Table 16. Changes to pretreatment standards, or additional flows over the current permit limit of 24,000 gpd, will require modification of the current permit.

Table 20 Summary of Location-Specific ARARs OII Site Final Record of Decision				
Location	**Citation**	**Description of Requirement**	**ARAR Determination**	**Comments**
Within 200 ft of a fault displaced in Holocene time	22 CCR § 66264.18(a)	Prohibits construction of new hazardous waste treatment, storage, or disposal facilities.	Applicable	Several faults have been identified in the area that may have been displaced during the Holocene period (EPA, 1994c).
Seismic Zone	23 CCR § 2547	Requires waste management units to be designed to withstand the maximum credible earthquake without damage to the foundation or to structures that control leachate.	Relevant and appropriate for existing units; applicable for new units	Appropriate seismic protection measures are required for existing leachate collection and treatment units at the OII Landfill. Any new waste management units must be designed to withstand the maximum credible earthquake.
Migratory bird area	16 U.S.C. § 703	Protects species of native birds in the U.S. from unregulated "take," which can include poisoning at hazardous waste sites.	Applicable	OII Landfill provides habitat for protected bird species. The remedial design process will identify any measures necessary to prevent an unregulated "take" of protected bird species.

Table 21 Action-Specific ARARs OII Site Final Record of Decision			
Citation	**Description of Requirement**	**ARAR Determination**	**Comments**
Landfill Maintenance, Closure and Postclosure			
22 CCR § 66265.31	Requires maintenance and operation of facilities to minimize fire, explosion, or release of hazardous substances.	Applicable	The remedial design process will identify appropriate measures consistent with the provisions of this requirement.
22 CCR §§ 66265.32, 66265.33, 66264.34, 66265.37(a), 66265.55, 66265.56(a)-(c), (e)-(h)	Specifies emergency and communications systems for hazardous waste facilities, testing of equipment, and arrangements for emergency support services.	Applicable	The remedial design process will specify appropriate communication and emergency systems consistent with the substantive provisions of these requirements.
22 CCR § 66265.14	Requires security measures sufficient to prevent unknowing or unauthorized entry onto hazardous waste facilities.	Applicable	Substantive provisions are pertinent to OII Site security. Appropriate security measures could include existing or upgraded systems.
14 CCR § 17767(c)	Requires security measures to prevent unauthorized access to closed landfills and monitoring, control, and recovery systems.	Relevant and appropriate	Substantive provisions are pertinent to OII Site security. Appropriate security measures could include existing or upgraded systems.
14 CCR § 17701	Requires operation and maintenance of landfills to prevent public nuisance.	Relevant and appropriate	The remedial design process will identify appropriate measures to prevent public nuisance.
14 CCR § 17706	Requires operation and maintenance of landfills to minimize dust creation.	Relevant and appropriate	The remedial design process will identify appropriate measures to minimize dust creation.
14 CCR § 17707	Requires operation and maintenance of landfills to control vectors (insects, rodents, etc.).	Relevant and appropriate	The remedial design process will identify appropriate measures to maintain vector control.
14 CCR § 17713	Requires operation and maintenance of landfills to control odors.	Relevant and appropriate	The remedial design process will identify appropriate measures to maintain odor control.
22 CCR § 66265.111 (a),(b)	Requires closure to minimize need for further maintenance and to protect human health and the environment from releases of hazardous substances.	Applicable	The remedial design process will identify measures to reduce maintenance and prevent releases consistent with the provisions of this requirement.
22 CCR § 66265.310 (b)(1), and (b)(3) except references to §§ 66265.118 - 120.	Requires facility closure to minimize chance of postclosure release of hazardous waste; facilitate postclosure maintenance, monitoring and emergency response.	Applicable	The remedial design process will identify specific post-closure care measures consistent with the provisions of this requirement.
22 CCR § 66265.95	Establishes the point of compliance for groundwater protection standards as a vertical surface located at the hydraulically downgradient limit of the waste management area.	Applicable	The remedial design process will identify well locations to monitor compliance with the groundwater protection standards consistent with the provisions of this requirement.
22 CCR § 66265.96	Defines the compliance period for groundwater quality as the number of years equal to the active life of the waste management unit. Requires restarting the compliance period if evaluation monitoring is initiated.	Applicable	The remedial design process will specify the compliance period for specified areas consistent with the provisions of this requirement.
22 CCR § 66264.96(c)	Extends groundwater quality compliance period until groundwater protection standard has been met for three consecutive years.	Applicable	This requirement would extend the compliance period if groundwater performance standards are not met by the end of the period specified by 22 CCR § 66265.96. Applicable (by reference from 22 CCR § 66265.99) when groundwater remediation is required at interim status facilities.

Table 21
Action-Specific ARARs
OII Site Final Record of Decision

Citation	Description of Requirement	ARAR Determination	Comments
22 CCR § 66265.98 (a) - (l)	Requires release detection monitoring in areas unaffected by prior releases.	Applicable	The remedial design will specify the elements of a monitoring program consistent with the substantive provisions of this requirement to detect new groundwater performance standard exceedances in areas where no exceedances of groundwater performance standards previously occurred.
22 CCR § 66265.99(a), (b), (e)(1) - (4) and (6) except for references to surface water	Requires evaluation monitoring to assess the nature and extent of any exceedances of groundwater performance standards.	Applicable	The remedial design will specify the elements of a monitoring program consistent with the substantive provisions of this requirement to evaluate the nature and extent of exceedances of groundwater protection standards in groundwater.
22 CCR § 66264.100(d)	Requires water quality monitoring program to measure effectiveness of remediation.	Applicable	The remedial design process will identify the measures necessary to monitor the effectiveness of groundwater remediation. Applicable (by reference from 22 CCR § 66265.99) when groundwater remediation is required at interim status facilities.
22 CCR § 66265.117 (b)-(d) except references to 66265.118, 119 and 120.	Requires post-closure care for 30 years after completion of closure of the interim status hazardous waste management facilities.	Applicable	Post-closure care includes monitoring and maintenance of waste containment systems. EPA may determine that the length of the period may be modified.
Los Angeles Regional Water Quality Control Board Order WDR 96-054 NPDES # CAS614001	Establishes requirements for stormwater discharges from hazardous waste treatment, storage and disposal facilities	Applicable to on-site discharges; otherwise off-site discharge requirement	Stormwater discharges from the site fall within the scope of the general permit. Stormwater discharges to the sanitary sewer are not included, but are addressed in the Sanitary District permit for the Leachate Treatment Plant.
Landfill Liquids Treatment and Disposal			
22 CCR § 66264.601	Requires location, design, construction, operation, and maintenance of miscellaneous units that treat hazardous waste to ensure protection of human health and the environment.	Applicable to new units; portions applicable or relevant and appropriate to existing units	New units that treat leachate, a listed hazardous waste (F039), must meet these requirements. Requirements for operation, maintenance and closure are relevant and appropriate to existing leachate treatment units.
22 CCR §§ 66264.192, 66264.193(c)-(f), 66264.194, 66264.195, 66264.197	Requires construction, operation, and closure of hazardous waste treatment in tanks to comply specified standards, including secondary containment, inspections, and operating limits.	Applicable to new units; portions applicable or relevant and appropriate to existing units	New treatment tanks that treat leachate, a listed hazardous waste (F039), must meet the substantive provisions of these requirements. Substantive requirements for operation, maintenance and closure are relevant and appropriate to existing leachate treatment tanks.
23 CCR § 2581(c)(2) and (c)(3) except references to surface water	Requires operation of leachate collection and removal systems as long as leachate is generated and detected throughout the post-closure care period.	Applicable	Existing leachate collection systems, or functional equivalents, must be operated to the extent feasible (pursuant to 23 CCR § 2511(d)).
22 CCR § 66265.310(e)(2)	Requires maintenance and operation of leachate collection, removal and treatment system to prevent excess accumulation of leachate during post-closure care period.	Applicable	The remedial design process will identify appropriate measures to prevent excess accumulation of leachate.
22 CCR §§ 66264.1050 - 1063	Sets air emission standards for equipment leaks for units from facilities that contain or contact hazardous wastes with organic concentrations of at least 10 percent by weight.	Applicable	Substantive provisions may be applicable to specified equipment.

Table 21
Action-Specific ARARs
OII Site Final Record of Decision

Citation	Description of Requirement	ARAR Determination	Comments
22 CCR §§ 66264.32, 66264.33, 66264.34, 66265.37(a), 66265.55, 66265.56(a)-(c), (e)-(h)	Specifies emergency and communications systems for hazardous waste facilities, testing of equipment, and arrangements for emergency support services.	Applicable	The remedial design process will specify appropriate communication and emergency systems for the leachate treatment plant consistent with the provisions of these requirements.
Excavation, Construction and Disposal			
22 CCR § 66265.114	Requires equipment, structures and soils to be properly disposed of or decontaminated during closure.	Applicable	The remedial design process will identify procedures to comply with this requirement.
22 CCR § 66265.13	Requires analysis of hazardous waste before transfer, treatment, storage or disposal.	Applicable	Excavation or other management of wastes must meet these requirements.
22 CCR § 66262.34	Allows storage of hazardous waste onsite in containers for up to 90 days.	Applicable	Applicable to wastes managed during implementation or maintenance.
22 CCR §§ 66264.171 - 66264.175, 66264.178.	Requires storage of waste in appropriate containers, and appropriate management and closure of containment areas.	Applicable to new units, relevant and appropriate for existing units	Applicable to wastes managed in containers during implementation or maintenance.
22 CCR § 66264.552 (e)(1) - (4)	Allows redisposal of hazardous wastes generated as part of remediation in designated units	Applicable to new units, relevant and appropriate for existing units	Designated onsite units may receive redisposed wastes from the landfill.
22 CCR § 66264.553 (b),(c)	Allows establishment of temporary tanks and container storage areas for treatment or storage of remediation wastes	Applicable to new units, relevant and appropriate for existing units	Temporary tanks and container storage areas may be established during remediation consistent with this requirement.
SCAQMD Rule 402	Limits discharge of any air contaminant or material that causes injury, detriment, nuisance, or annoyance, or that endangers the comfort, repose, or safety of the public, property, or business.	Applicable	Applies to any activities conducted that generate air contaminants or materials.
SCAQMD Rule 403	Limits downwind concentration of PM-10 from fugitive dust to 100 g/m^3 above upwind concentration, averaged over 5 hours.	Applicable	Applies to activities generating fugitive dust (i.e. earth-moving, construction/ demolition, or vehicular movement).
SCAQMD Rule 1150	Requires mitigation measures that ensure a nuisance does not occur when buried waste is exposed.	Applicable	Potentially applicable to construction or maintenance activities.

9.1 Chemical-Specific ARARs

The only chemical-specific ARARs that pertain to the selected remedy are those that address water quality. Chemical-specific soil requirements are not pertinent to the selected remedy, as the remedy does not select any response for soil (although action-specific ARARs would apply to management of contaminated soils and wastes necessitated by implementation of the remedy or site maintenance). Chemical-specific surface water and air requirements are addressed in the Gas Control and Cover ROD. Chemical-specific ARARs are listed in Table 19.

Drinking Water Standards. Section 121(d)(2) of CERCLA, 42 U.S.C. § 9621(d)(2), requires CERCLA cleanups to attain water quality criteria established under the Safe Drinking Water Act if those criteria are relevant and appropriate, considering, among other factors, the designated or potential use of the water resource. The 1995 Water Quality Control Plan for the Los Angeles Region (known as the "Basin Plan") designates the groundwater surrounding the OII Site as potential drinking water. EPA has identified the drinking water standards referred to as "Maximum Contaminant Levels" for site-related contaminants as an ARAR, using the more stringent of federally- or state-designated MCLs. Due to the complex hydrogeological setting at the OII Site, the minimal risks of exposure, and the limited potential use of the resource, EPA did not identify the more stringent standards known as "Maximum Contaminant Level Goals." MCLs for contaminants of concern at the OII Site are listed in Table 15.

Water Quality Standards for Landfill Closure. Landfill closure requirements under both federal and State law prescribe water quality protection standards. The OII Site is an "interim status" hazardous waste landfill, having received hazardous wastes after November 19, 1980, the effective date of the Resource Conservation and Recovery Act of 1978, 42 U.S.C. § 6901, and having never obtained a final permit. Regulations governing closure of interim status landfills are applicable to the OII Site. The California hazardous waste program is federally authorized to operate in lieu of the federal program; therefore, the California interim status regulations are considered federal ARARs. Federal and state regulations applicable to permitted facilities may be, as a general matter, relevant and appropriate to interim status facilities; however, with regard to chemical-specific water quality protection, those regulations that are both relevant and appropriate are no more stringent than the interim status regulations. However, certain regulations applicable to groundwater protection standards at permitted facilities where releases have taken place are applicable to interim status facilities by reference from the interim status regulations. These regulations are also considered federal ARARs.

The OII Site also accepted municipal solid waste (such as household trash), but stopped accepting these wastes prior to the effective date of federal and state regulations for municipal solid waste landfills. These regulations may be, as a general matter, relevant and appropriate to older landfills that accepted municipal solid wastes; however, as with the regulations for permitted hazardous waste facilities, those solid waste regulations pertaining to chemical-specific water quality protection that are both relevant and appropriate are no more stringent than the interim status regulations.

The applicable regulations allow a water quality protection standard greater than background, if it is technically or economically impracticable to attain background levels, provided that the standard is protective of human health and the environment and is no higher than MCLs. Due to the complex hydrogeological setting at the OII Site, the minimal risks of exposure, and the limited potential use of the resource, EPA selected MCLs that exceed baseline levels, and health-based levels for contaminants that have no MCLs, as the ARAR. The MCLs and health-based levels are listed on Table 15.

Offsite Discharge to the Sanitary Sewer. The Leachate Treatment Plant discharges effluent to the sanitary sewer. This effluent subsequently undergoes further treatment at County Sanitation Districts of Los Angeles County facilities. This discharge is considered an "offsite" activity; therefore, the activity is not subject to ARARs and must meet not only substantive, but also administrative, requirements. The substantive requirements include chemical-specific criteria for the effluent. The requirement for a permit is listed in Table 19 solely for informational purposes.

9.2 Location-Specific ARARs

The OII Site presents two location-specific issues: seismic (earthquake-related) requirements and a requirement related to protected bird species. The location-specific ARARs are listed in Table 20.

Seismic Requirements. The OII Site is located near several faults that may have been displaced during the Holocene period. New hazardous waste treatment, storage, or disposal facilities may not be built within 200 feet of such a fault. In addition, regulations promulgated by the State Water Resources Control Board require waste management units to be designed to withstand the maximum credible earthquake for their location. This requirement is applicable for new facilities, and relevant and appropriate to existing facilities (to the extent that existing facilities can be made to withstand the maximum credible earthquake).

Migratory Bird Area. The OII Site provides habitat to several species of migratory birds protected under federal law. The prohibition against "taking" such migratory birds, which can include poisoning at hazardous waste sites, is applicable.

9.3 Action-Specific ARARs

Federal and/or state environmental requirements address numerous activities required by the selected remedy. These activities include landfill maintenance, closure, and postclosure; landfill liquids treatment and disposal; and excavation, construction, and disposal. The action-specific ARARs are listed in Table 21.

Landfill Maintenance, Closure, and Postclosure. The interim status regulations pertinent to landfill maintenance (such as emergency prevention and security) and to landfill closure and postclosure are applicable to the OII Site. Certain permitted facility regulations pertaining to monitoring the effectiveness of water quality remediation and to the water quality compliance period for facilities undergoing water quality remediation are applicable by reference to interim status facilities. Certain state standards for nuisance-related controls at municipal solid waste facilities are more stringent than interim status regulations, and are relevant and appropriate to the selected remedy. In addition, stormwater discharge requirements are applicable for onsite discharges not addressed in the Gas Control and Cover ROD (offsite discharges must meet both administrative and substantive requirements). Stormwater discharges that will be addressed under the Gas Control and Cover ROD are subject to the ARARs identified in that ROD.

The Gas Control and Cover ROD, which is a final ROD, identified ARARs for landfill gas collection and destruction. Gas collection and destruction activities undertaken as site control measures (termed the "gas extraction and air dike system") prior to their inclusion as activities under the Gas Control and Cover operable unit are subject to the ARARs identified in the Gas Control and Cover ROD. To the extent that these interim gas collection and destruction activities cannot meet specific ARARs, such ARARs are waived for the interim measures, as implementation of the Gas Control and Cover ROD will achieve the ARARs.

Landfill Liquids Treatment and Disposal. The interim status regulations, which require leachate collection and removal to prevent excess accumulation, are applicable to the OII Site. The State Water Resources Control Board regulation for leachate collection and removal is different in scope and also applicable, requiring leachate collection and removal through the postclosure period. However, as the OII Site is undergoing remediation under the oversight of a public agency, the State Water Resources Control Board regulation is only applicable to the extent feasible.

Design and construction requirements for permitted facilities are applicable to any new units implemented under this remedy. Operation, maintenance, and closure requirements are applicable to new units and either applicable or relevant and appropriate to existing units (depending on when they were constructed).

Off-gas from the leachate treatment plant is collected and sent through the existing "foul air" system to the landfill gas control system for destruction. ARARs for the landfill gas control system are included in the Gas Control and Cover ROD.

Regulation of air emissions from equipment leaks is applicable if specified equipment contains hazardous wastes with organic concentrations of 10 percent or more.

Excavation, Construction and Disposal. The interim status regulations, which require analysis of hazardous wastes prior to management and proper disposal or decontamination of equipment, structures and soils during closure, are applicable. Requirements for permitted facilities for storage of waste, temporary tanks, and containers, and redisposal of remediation wastes are applicable to new remediation units and relevant and appropriate for existing units. In addition, South Coast Air Quality Management District (SCAQMD) regulations pertinent to construction, excavation, and maintenance of systems other than those addressed by the Gas Control and Cover ROD are applicable.

10.0 Documentation of Significant Changes

EPA issued the Proposed Plan for this remedy at the OII Site for public comment in June 1996. The Proposed Plan identified Alternative No. 2, Perimeter Liquids Control, as the preferred alternative. EPA reviewed all written and verbal comments submitted during the public comment period. After reviewing these comments, EPA has determined that no significant changes to the remedy, as originally identified in the Proposed Plan, are necessary.

11.0 Statutory Determinations

EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for a site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental requirements and state facility siting requirements (unless a statutory waiver is justified). The selected remedy must also be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy at the OII Site meets these statutory requirements.

11.1 Protection of Human Health and the Environment

The selected remedy protects human health and the environment by eliminating, reducing, or controlling site-related risk through perimeter liquids control and treatment of landfill contaminants, natural attenuation of groundwater contaminants beyond the landfill boundary, and implementation of institutional controls to significantly reduce the potential for future exposure to landfill-related contaminants and contaminated groundwater. The selected remedy further protects human health and the environment by providing for groundwater monitoring that will track movement of the groundwater contamination and detect any potential adverse impacts. This will allow for ongoing evaluation of groundwater quality and implementation of contingency measures, if necessary (e.g., if natural attenuation is not progressing as anticipated [see Table 17]). There is no current use of, or exposure to, groundwater in the OII Site vicinity.

Site security and institutional controls on the landfill will provide protection of human health and the environment from landfill contents.

There are no short-term threats associated with implementation of the selected remedy that cannot be readily mitigated. Further, no adverse cross-media impacts are expected from the remedy.

11.2 Compliance with ARARs

The selected remedy of perimeter liquids control, liquids collection and treatment, natural attenuation of groundwater, groundwater monitoring, and institutional controls will comply with all federal and state applicable or relevant and appropriate chemical-, action-, and location-specific requirements (ARARs). Federal and state ARARs pertinent to the selected remedy are discussed in Section 9. The specific ARARs for the selected remedy are presented in Tables 19, 20, and 21.

As discussed in the comparison of remedial alternatives section (Section 7.2), there is a slight potential that because of the complex groundwater flow conditions and low-permeability formation, natural attenuation may take an excessive amount of time to reduce inorganic constituents in groundwater southwest of the landfill to cleanup standards.

11.3 Cost-Effectiveness

EPA has determined that the selected remedy is cost-effective because it will provide increased protectiveness at a reasonable cost in comparison to the other alternatives. The estimated total net present worth of the selected remedy is $162 million. This represents an increase of only 14 percent over Alternative No. 1 (No Further Action), yet it would be more protective of human health and the environment than Alternative No. 1. Further, unlike Alternative No. 1, the selected remedy meets ARARs. The selected remedy is the least costly alternative that is fully protective of human health and the environment and that meets ARARs. Alternatives No. 3 and 4 do not offer additional benefits commensurate with the associated increases in cost and would therefore not be cost-effective.

11.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner.

Of those alternatives that meet the two threshold criteria of overall protection of human health and the environment and compliance with ARARs, EPA has determined that the selected remedy provides the best balance of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; costs; and state and community acceptance.

The selected remedy is in part a containment-based remedy and is consistent with EPA's Presumptive Remedy for CERCLA Municipal Landfill Sites (EPA, 1993c). The remedy also includes considerable collection, removal, and treatment of landfill contaminants through the perimeter liquids control system. The perimeter liquids control system addresses the principal threats posed by landfill contaminants through inhibiting further migration of contaminants to groundwater. The other principal threats, landfill contents and landfill gas, were previously addressed through the Gas Control and Cover ROD.

The component of the selected remedy for groundwater beyond the landfill perimeter offers a high degree of long-term effectiveness through natural attenuation enhanced by perimeter liquids control, groundwater monitoring to ensure that contamination does not spread to potential receptors, and implementation of institutional controls to prevent future exposure to contaminated groundwater. (As noted above, there is no current use of or exposure to groundwater in the vicinity of the OII Site.)

Although the Alternative No. 3 (Source Control plus Perimeter Control) and Alternative No. 4 (Groundwater Control plus Perimeter Control) alternatives may offer slightly increased protection of human health and the environment, these slight increases would only be realized at significantly higher costs. In addition, Alternative No. 4 has substantially higher community impacts than the selected remedy.

11.5 Preference for Treatment as a Principal Element

By treating the landfill contaminants collected in the perimeter liquids control system at the onsite treatment plant, the selected remedy addresses one of the principal threats posed by the site through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is at least partially satisfied. The selected remedy does not use active treatment as a principal element for existing groundwater contamination. However, the combination of perimeter liquids control, natural attenuation, groundwater monitoring, and institutional controls prevents exposure and offers a permanent solution to the groundwater contamination.

References

Andelman, J. B., L. C. Wilder and S. M. Myer. "Indoor Air Pollution from Volatile Chemicals in Water" *INDOOR AIR '87, Vol. I, Proceedings of the 4th International Conference on Indoor Air Quality and Climate*. Institute for Water, Soil and Air Hygiene. Berlin. 1987.

California Department of Water Resources. *Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County, Appendix A, Ground Water Geology.* Bulletin of the California Division of Water Resources, 104. 1961.

———. *Planned Utilization of Ground Water Basins, San Gabriel Valley, Appendix A, Geohydrology.* Bulletin of the California Division of Water Resources, 104-2. 1966.

California Regional Water Pollution Control Board No. 4, Los Angeles Region. Resolution No. 54-15, Prescribing Requirements for Disposal of Refuse at Monterey Disposal Company Dump, 900 Potrero Grande Road, Monterey Park. October 6, 1954.

CDM Federal. Personal communication between Roderick J. Higbie, P.E., CDM Federal Programs, and Gary Santolo, CH2M HILL. February 24, 1994.

Cogliano, V. J., J. C. Parker, and W. E. Pepelko. "Vinyl Chloride: Another Look." *The Toxicologist.* 10:349. 1990.

Cogliano, V. J. and J. C. Parker. "Some Implications of Toxicology and Pharmacokinetics for Exposure Assessment." *Journal of Exposure Analysis and Environmental Epidemiology.* Supplement 1. 1992.

Cogliano, V. J., G. F. S. Hiatt, and A. R. Den. "A Quantitative Risk Assessment for Vinyl Chloride—Indications of Early-Life Sensitivity." *Toxicology.* (in press).

County Sanitation Districts of Los Angeles County. *Industrial Wastewater Discharge Permit No. 13196.* June 21, 1994.

Hiatt, G. F. S., V. J. Cogliano, R. A. Becker, et al. *Vinyl Chloride—Indoor Air Action Levels at a Superfund Site.* Hazardous Waste and Public Health: The International Conference on the Health Effects of Hazardous Waste. Princeton Scientific Publishing. 1994.

Los Angeles County Department of Public Works. Drains and Facilities. 1987.

————. Coastal Plain Deep Aquifer Groundwater Contour Map. Fall, 1991a.

Los Angeles Regional Water Quality Control Board. Order No. 76-30, Revised Waste Discharge Requirements for Operating Industries, Inc. March 22, 1976a.

————. Order No. 76-133, Revised Waste Discharge Requirements for Operating Industries, Inc. September 27, 1976b.

————. Order No. 84-119, Amended Waste Discharge Requirements for Operating Industries Landfill. November 19, 1984.

OII Landfill Work Defendants. *Report of Recommendations, Evaluate and Design LFG Migration System for the Southwestern and Western Boundaries of the OII Landfill.* Prepared by Bryan A. Stirrat & Associates, Inc. for CURE, Inc. August 19, 1992b.

————. *Seep Mitigation Field Examination & Evaluation.* Prepared by Bryan A. Stirrat & Associates for CURE, Inc. December 6, 1993a.

————. *OII SCM/LMS Monthly Progress Reports.* Prepared by CURE, Inc.; Contributions by Environmental Solutions, Inc.; Bryan A. Stirrat & Associates; and James M. Montgomery, Inc., and New Cure, Inc. January 1990 to December 1994.

————. *Draft Data Synthesis Report for Seismicity, Settlement, and Slope Stability, OII Landfill CD-3 Activities.* Prepared by Environmental Solutions, Inc. for New Cure, Inc. February 1994a.

————. *Technical Memorandum No. 14, Report of Findings, Geophysical Measurement for Seismic Analysis.* OII Landfill CD-3 Activities. Prepared by Environmental Solutions, Inc. for New Cure, Inc. January 17, 1995b.

U.S. Department of Commerce. 1990 Census. Summary Tape Files 1A and 3A. 1990b.

U.S. Environmental Protection Agency. *Analysis Results for the July, 1986 Operating Industries Site Samples, Los Angeles, CA - NEIC Project D24.* Correspondence from Dr. Joe Lowry, NEIC. September 16, 1986a.

————. *Guideline for Carcinogen Risk Assessment.* 1986b.

————. *Record of Decision, Operating Industries, Inc., Monterey Park, California, Site Control and Monitoring Operable Unit.* July 31, 1987a.

————. *Record of Decision, Operating Industries, Inc. Monterey Park, California, Leachate Management Operable Unit.* November 16, 1987b.

———. *Draft Technical Memorandum, Site Characterization and Installation of Landfill Gas Monitoring Wells, North Parcel, Operating Industries, Inc., Monterey Park, California.* Prepared by CH2M HILL and Black and Veatch. October 1987d.

———. *Leachate Management Feasibility Study, Operating Industries, Inc. Landfill Site*. Prepared by Camp Dresser & McKee Inc. December 30, 1987e.

———. Record of Decision, *Operating Industries, Inc., Monterey Park, California, Gas Migration Control Operable Unit.* September 30, 1988b.

———. *South Parcel Hydrogeology Existing Data Technical Memorandum, Operating Industries, Inc., Monterey Park, California.* Prepared by CH2M HILL. October 12, 1988d.

———. *Operable Unit Feasibility Study for Landfill Gas Migration Control, Operating Industries, Inc., Monterey Park, California. Public Comment Draft.* Prepared by CH2M HILL. June 1988g.

———. *South Parcel Landfill Gas Monitoring Wells, Including Soil Borings Logs, Geophysical Logs, Cross Sections, and Monitoring Results.* Prepared by CH2M HILL. March 21, 1988h.

———. *Preliminary North Parcel Site Characterization, Operating Industries, Inc., Monterey Park, California.* Prepared by CH2M HILL. March 4, 1988i.

———. *CERCLA Compliance with Other Laws Manual: (Interim Final).* OSWER Directive 9234.1-01. August 1988k.

———. *Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part A).* Interim Final. EPA/540/1-89/002. December 1989d.

———. *CERCLA Compliance with Other Laws Manual: Part II. Clear Air Act and Other Environmental Statutes and State Requirements (Interim Final).* OSWER Directive 9234.1-02. August 1989f.

———. *Record of Decision, Amendment to Decision Summary, Operating Industries, Inc., Monterey Park, California, Gas Migration Control Operable Unit.* September 28, 1990a.

———. *Guidance for Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites.* OSWER Directive No. 9355.3-11. February 1991a.

———. *Draft Report for 24-Hour Ambient Air Sampling at the Operating Industries, Inc. Landfill Monterey Park, California.* Prepared by Science Applications International Corporation. February 1991c.

———. *Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual, Part B. Development of Risk-Based Preliminary Remediation Goals.* Interim Report. Publication 9285.7-01B. December 1991e.

———. *Risk Assessment Guidance for Superfund. Volume 1. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors."* OSWER Directive 9285.6-03. March 25, 1991f.

———. *Role of Baseline Risk Assessment in Superfund Remedy Selection Decisions.* OSWER Directive 9355.0.30. 1991k.

————. *Public Comment Draft, In-Home Air Monitoring Report, Operating Industries, Inc. Landfill, Monterey Park, CA.* Prepared by Science Applications International Corporation. November 16, 1993a.

————. *Presumptive Remedy for CERCLA Municipal Landfill Sites. Quick Reference Fact Sheet.* EPA 540-F-93-035. September 1993c.

————. *Draft Remedial Investigation Report, Operating Industries, Inc., Monterey Park, California.* Prepared by CH2M HILL. October 25, 1994c.

————. *Feasibility Study Report for Operating Industries, Inc. Landfill Superfund Site, Monterey Park, California.* Prepared by CH2M HILL. March 1996.